BULLETIN OF MISCELLANEOUS INFORMATION No. 7 1930
ROYAL BOTANIC GARDENS, KEW

XXXIV.—ON THE FLORA OF THE NEARER EAST: VI.*

A CONTRIBUTION TO OUR KNOWLEDGE OF THE FLORA OF AZERBAIDJAN, N. PERSIA. B. GILLIAT-SMITH AND W. B. TURRILL.

THE PERSIAN PROVINCE OF AZERBAIDJAN.

Topography.—Azerbaidjan (often spelt Azerbaijan or Azerbijan) is the most north-westerly province of Persia. It is divided from Soviet territory to the north by the river Aras (Araks or Araxes), has Turkish territory on the west, and is separated from the Caspian Sea on the east by the narrow province of Talysch. The province is the most fertile and the most healthy in Persia. The capital town of Tabriz is situated to the east of the large Lake Urmia at an altitude of 1340 m. (4400 ft.) and is just north of the centre of the province. The town itself is built in the valley of the Aji Chai ("Bitter River") which runs into the east of Lake Urmia. Its population is said to be over 200,000. Other spellings of the name, still sometimes used, are Toris and Tauris (the latter being especially used by the French and also by the Indo-European Telegraph Company).

The large salt water lake of Urmia is named with the town, which lies a short distance from its present western shores. The name is variously written Urmi, Urumia, Urumea, Urumiyeh, Ooroomieyal and Urumiyah. Since the advent of the present régime the name of the town, and presumably of the lake, has been changed to Rizaieh. The following particulars are mostly taken from a paper by R. T. Günther published in the Geogr. Journ. xiv. 505 (1899).

The Urmia Lake-basin is situated upon a plateau of over 4000 feet above sea-level and forming the water-parting between the rivers flowing into the Caspian Sea and into the Persian Gulf, or between the Arctic and Indian Oceans, since geologically and faunistically the Caspian is regarded as belonging to the Arctic system. On the plateau is a depression of which 1795 square miles are at present occupied by the Lake of Urmia and its islands at low water. The level of the Lake is about 4100 ft. above sea-level, about 4184 ft. above the level of the Caspian, and about 1114 ft. lower than Lake Van (5214 ft.). Its depth probably does not exceed 50 ft. and its average depth is probably less than 20 ft.

The size of the Lake is continually changing with the season of the year and with less regular but longer fluctuations. It is about

*Continued from *K.B.* 1930, p. 126.

80 miles from north to south and 24 from east to west. The shores are for the most part of a very gentle gradient ; but at certain places hills of Miocene limestone or of volcanic origin rise up abruptly from the usually flat shores. The waters of the lake are very salt. Günther and Manely [Proc. Roy. Soc. lxv. 316 (1899)] give the total salts in two samples of 100 grams of water as 14·814 and 14·893 respectively. In the Encyclopaedia Britannica, ed. xi. vol. xvi. 87 (1911), the total salts in 1000 grams of water are said to be 222·7730 grams, which is more than is given for the waters of the Dead Sea. It is certainly too salt to permit of the existence of fish life and apart from a species of *Artemisia*, the larva of a dipterous insect, bacteria, and diatoms the waters are lifeless.

To the north of the Lake lies the range of the Mishou (Mesho) Dagh, on which a considerable number of the plants enumerated below were collected.

To the south of Tabriz are low hills constituting the forelands of the now extinct volcano of Sahand (or Sahend), which reaches to an altitude of 3650 m. (12,000 ft.).

The central districts of Azerbaidjan are frequently subjected to great earthquakes, of which a recent one did great damage in and near Salmas and Khoi (see " The Times," 12 May, 1930, and " The Near East and India," 19 June, 1930, p. 687).

Geology. Tabriz itself is on recent alluvial and Pleistocene rocks. To the south one quickly reaches volcanic tuffs and the andesite, trachyte, basalt and so on of the extinct volcano of Sahand. Miocene and Pliocene beds outcrop to the north of Tabriz and more volcanic tuffs appear. A. F. Stahl deals in outline with the geology of Persia in the Handb. der Regionalen Geologie, 8 Heft, Bd. V. 6 (1911) and the same author orographically and geologically describes the Kara Dagh in a paper in Peterm. Geogr. Mitt. 1. 227 (1904) and records geological observations in N. W. Persia in a later paper in op. cit. lv. 1 (1909). In the map accompanying the last paper, a narrow strip of country is geologically mapped across Azerbaidjan, including the area immediately around Tabriz itself. Instead, however, of quoting from Stahl's paper we prefer to publish a translation of an unpublished account of the geology around Tabriz prepared by Mons. H. Rieben, a Swiss geologist resident in Tabriz, and whom we thank for his valuable contribution to our paper.

Geological description of the district around Tabriz.
By Mons. H. Rieben.
(Translated by W. B. Turrill.)

The immediate environs of Tabriz, within a radius of 20 to 30 km., include only Tertiary or Quaternary alluvial strata, or their remains.

The oldest beds date from the Upper Miocene and may be Tortonian. Similar gypsum- and salt-bearing layers are widely

spread from Asia Minor to Afghanistan, but are without fossils. It is possible, in places to the east of the town, to observe the continuous profile of these beds which pass upwards into the Pliocene ; the only striking unconformity is that which separates the Tertiary beds from the horizontal conglomerates forming sometimes the cornice of the Quaternary terraces.

The main part of the Miocene is characterized by the abundance of red sandstones, alternating at first with some conglomerates, then higher with red, then with grey, and then with yellowish marls. Once past the cliffs of the chain of Ainali, which dominate the town to the north and the north-east, these beds give usually an aspect of " bad-lands " to the country. Intrusions of trachytes occur, as in the dome of Bahlul Dagh, some 20 km. to the north, which is a laccolith piercing the red sandstones. These red sandstones are without fossils, apart from a few rare traces of plant remains, and have extremely eroded surfaces, often with salt. The marls in certain places are rich in gypsum and equally in salt ; their outcrops are always recognised by their sterility. To the south of Tabriz, a sector symmetrical to the preceding, more homogeneous still, includes the accretions furnished from before the end of the Miocene and during the Pliocene by the massif of Sahand, formerly a considerable volcano. Its most northerly deposits are some twenty or twenty-five kilometres from Tabriz and form the extreme north of the massif. The latter is separated from the plain of Tabriz to the north, from Lake Urmia to the west, and from the Tertiary chain with red sandstones mentioned above to the north-east, by vast masses of deposits attaining a mean altitude of 400 m. above that of the town and stopping at a level of a striking regularity ; that of the high terrace. The end of this ancient delta is now cut by numerous valleys of unequal length, the most important extending even up to the Sahand ; three only possess a nearly permanent stream of water ; they are separated one from the others on the fringe of the plateau, by the small chains of rounded hills which project towards the plain. The sandy watersheds are strewn with large pebbles, trachytes, andesites, pumice-stones, etc., which a long exposure to the elements has often rendered very friable. Sometimes a high proportion of this sand comes from beds of rather thick cinders, more or less horizontal and alternating with conglomerates of the same volcanic elements or with sandstones or with banks of sand hardly cemented. All these deposits have a great porosity and allow the water to penetrate, this being retained by the lacustrine clays which occur at the base of the hills and of the last promontories which project into the plain of Tabriz. These white clays with small fishes (*Brachylabrus persicus* Priem) alternate equally with the beds of volcanic cinders and some banks of conglomerate of slight thickness where one already meets the trachytes of Sahand ; they pass suddenly but without apparent discordance into the Miocene of which we have spoken above.

To the East of Tabriz, following the axis (WWN-EES) of the Iranian chains is a zone of transition that often covers the deposits again and where are clearly visible, as everywhere else, two, three, or four stages of terraces, marking the stages of retreat of Lake Urmia. This zone extends from the cliffs of red sandstone of Ainali to the N.E. of the town, at the base of the alluvial or Pliocene deposits coming from Sahand to the east. Here the sandstones and the red marls have given place to clear marls or clays, with interbedded bands of limestone, carbonaceous shale, and lignite ; lagune facies with abundant plant impressions and small molluscs (*Planorbis* and *Limnaea*), and veins and beds of gypsum are also frequent. To the south of Sari Dagh or yellow hill of the suburb of Bagh-Meche the beds become more and more horizontal passing into the clays with small fishes and cinders of the Pliocene.

The town of Tabriz is constructed in the eastern angle of a vast lacustrine plain marking the last retreat of that inland Pleistocene sea of which Lake Urmia is the actual vestige. Adji-Tchai flows into the lake near the town. This stream after having cut through in one place or another all the beds of red sandstone and marls of the Upper Miocene whose salt springs it drains, stretches its branches and meanders to the centre of the plain which becomes more and more a desert of salt as one approaches Lake Urmia. Towns and villages occur along the edge of this plain and the alluvial beds actually spread in large cones overlapping one another and having slight slopes.

Around Yam, between Marand and Sofian, are found the same Upper Tertiary strata. The red salt-bearing marls there form the bottom of some rather swampy valleys. Sandstones and conglomerates are much more volcanic than those to the north of Tabriz ; of a grey colour, they are sometimes cut through by very thin dykes ; these apparently belong to the Upper Miocene or perhaps to the Pliocene.

That which makes Yam a peculiar place is the imposing presence of Mishou Dagh, whose chain, commanding the northern end of Lake Urmia, terminates suddenly at Yam, where it immediately passes under the above-mentioned Tertiary rocks. The mountain which dominates Yam to the south is formed by a crystalline mass of red porphyritic granites, gabbros, and others which in many places result from (? in) the metamorphism of the sedimentary rocks. The eastern summits of Mishou, in particular that of Yam, are formed by a cap of generally greyish or pale limestones, which some clayey fossiliferous beds indicate are of Permian or Carboniferous age. Whilst at the base of Mishou, at least near Yam, there appear some thin beds of greyish black limestones with numerous fossils of *Orbitolina* ; all the evidence indicates a Cretaceous age for these.

The pass of Yam is at an elevation of about 400 m. above the plains of Tabriz and Marand. Of a length of about 3 km., it is formed of a line of alluvial cones of different dates and of materials from

different sources, as proved by their relation to the vestiges of primitive cones corresponding to the base of the upper terraces of the Pleistocene. The arable ground is of unusual thickness which facilitates the cultivation of cereals. In spite of their altitude, these alluvial beds have not been weathered away because of the chain of volcanic grits, immediately to the north of the entrance, thus facing Mishou Dagh, and like it orientated along the axis of the Iranian foldings. All these alluvial beds have come from Mishou Dagh ; some such cones show only crystalline debris, others blocks of limestones, and others mixtures of these materials, according to the orientation of the ravines and their collecting basins.

Memorial School, Tabriz, Nov. 1929.
Hubert Rieben.

Climate.—Some general notes on the climate of central Azerbaidjan are given in the account of botanizing during 1925-29 published below. Dr. C. E. P. Brooks informs us that practically no information on the climate of the Tabriz district is available at the Meteorological Office. Supan [in Peterm. Geogr. Mitt. Ergänzungsband xxvi. Heft 124, 64 (1898)] gives the following rainfall for Urmia (Urmiah), apparently based on one year's records :

	mm.		mm.
January ...	43	July	—
February ...	72	August ...	12
March	103	September ...	16
April	133	October ...	38
May	62	November ...	24
June	11	December ...	33
		Year	547.

Previous Botanical Exploration of Azerbaidjan.

Previous to the collection enumerated in this paper the only material from Azerbaidjan to be found in the large European herbaria has been obtained by travellers who have remained in the country for relatively short periods and usually only for the spring or summer season. The following list is as complete as it has been possible to make it but probably some small collections have been overlooked and there may be some of which no accounts have been published.

Olivier and Bruguière made a collection in 1796-97 in Iraq, north and west Persia. According to De Candolle [La Phytographie 438 (1880)] 720 species are represented in the main collection which is at the Muséum d'hist. nat. de Paris, with duplicates in Herb. de Candolle. It has not been possible to ascertain how many of these are from Azerbaidjan.

Bélanger at the beginning of his " Voyage aux Indes-Orientales pendant les années 1825-1829 " visited Persia and passed through Tabriz. His specimens are at Geneva (Herb. Delessert). Some of the Persian Spermatophyta he collected were figured in his

" Voyage-Planches " but no descriptions were published by him. *Cirsium spectabile* (Pl. ii), for example, was first described in DC. Prodr. vi. 641 (1837) and *Cousinia aggregata* in l.c. 553. Exact localities for Bélanger's specimens are not known.

The Russian naturalist **Szowits** made a rich collection of plants in 1828 in Azerbaidjan, especially in the neighbourhood of Tabriz, Khoi, and Urmia. His main collection is at Leningrad but less complete sets are to be found in many European herbaria, and Kew possesses a considerable number of sheets collected by him. New species, first found by Szowits, were described mainly by Fischer and Meyer (Ind. Sem. Hort. Petrop), de Candolle (Prodromus), and Boissier (Flor. Or.).

In 1837, **Aucher-Eloy**, on his second expedition into Persia, entered the country from the north and botanized around Khoi, Salmas, and Tabriz. An account of his route is given in his Relations de Voyages en Orient ii. 399-403 (1843). His plants were described largely by Boissier (in Ann. Sci. Nat., Diagnoses, and Flor. Or.) and by Jaubert and Spach (Illustr. Flor. Or.).

Buhse in 1847-49 travelled widely in Armenia and North Persia. He spent a considerable part of June and all or most of July 1847 in Azerbaidjan. An account of his route and an enumeration of his specimens are given in the work by Boissier and himself Aufzaehlung der auf einer Reise durch Transkaukasien und Persien gesammelten Pflanzen (Moskau, 1860).

Seidlitz travelled round Lake Urmia in Sept.-Oct., 1856, having previously twice visited the Sahand Range. An account by him of his journey round the Lake is published in Peterm. Geogr. Mitt. 1858, 227. Boissier named several plants after him, including *Inula Seidlitzii* in Flor. Or. iii. 189 (1875), and the Chenopodiaceous genus *Seidlitzia* Bunge ex Boiss. Flor. Or. iv. 950 (1879) also commemorates him. Bunge, dealing with Persian *Labiatae* in Mem. l'Acad. Imp. Sci. St. Petersb. Ser. vii. tom. xxi. No. 1 (1873), also refers to specimens collected in Azerbaidjan by Seidlitz.

Bunge left the Russian expedition to Persia and Afghanistan, 1859, and returned to Russia with his assistant Bienert via N. Persia and Tiflis. It was presumably on his return journey that he collected those plants from Azerbaidjan which are quoted with his name in his numerous monographs and papers on Near Eastern plants, and by Boissier.

Knapp in 1884 made a considerable collection in Azerbaidjan. The *Labiatae, Chenopodiaceae, Amarantaceae, Polygonaceae, Ranunculaceae, Berberidaceae, Papaveraceae,* and *Fumariaceae* were worked out by Braun and Rechinger and published in the Verhl. Zool. Bot. Ges. Wien xxxix. 214 (1889), l.c. 240, op. cit. xliv. 88 (1894). The complete list of Knapp's plants, however, was published by Bornmüller in the Verhl. Zool. Bot. Ges. Wien lx. 61 (1910). This is a very valuable list in spite of the fact that it is based on material which often left much to be desired.

The account by **Grossheim** of his collection made in June 1924, published in Beih. Bot. Centrlbl. xliv. 199 (1927), is the last published list of plants from Azerbaidjan.

Cowan and Darlington visited the province in May and June, 1929, and made a collection which has not yet been critically determined. An account of their journey is given in the *Kew Bulletin* 1930, 49.

Botanizing in the Tabriz District, 1925-1929.

B. Gilliat-Smith.

To one newly arrived from Europe, even from South Eastern Europe, the immediate vicinity of Tabriz, roughly typical of the greater part of the northern Iranian Tableland, presents a most desolate aspect, at a first glance not unlike, one would imagine, the surface of the moon. There is a complete absence of trees or even of bushes, save where planted by man, or at rare intervals in deep crevasses where a small brook trickles more or less permanently. The air is clear and bracing, the climate good, but treacherous to uninitiated Europeans, owing to the sudden changes in temperature. Sunshine is more or less permanent, with few exceptions in spring and autumn, or during the winter snow-storms. The soil is fertile, but produces little where not watered by artificial irrigation. Winter is long and dreary, in spite of the sunshine. Snow covers the higher peaks of the Sahand Range from the end of October or the beginning of November until the end of May, and it is not uncommon for some snow to remain on the northern slopes all the year round. Snow lies on the hills surrounding Tabriz for the greater part of the winter, and intermittently in the town itself. Details as to the geographical situation of Tabriz are given above. The town lies in a vast plain, narrow at its eastern end and cut up into gulleys ; tilted westward and broadening out towards Lake Urmia, and having on the south side the offshoots of the Sahand Range and on the north side the red hills of Einal Zeinal.

The first beginning of spring is noted about the 21st March, the Persian New Year, on which date, or slightly later, on the hills to the north and south of Tabriz are to be found here and there patches of *Iris persica* and, to the north only, the varieties *Krelagii* (claret) and *cyanea* of *Iris reticulata*. The var. *typica* of the species is not found wild. Spring is slow in coming. Garden flowers, mostly annuals, are sown generally at the end of March, or the beginning of April, and gardens are at their best in August. A night or two of severe frost in mid-November will generally destroy everything.

Orchards are a great feature of the country. Riding out in the desert hills one may suddenly come upon an enclosure surrounded by a mud-brick wall, the haunt of hoopoes and the little owl. The trees planted are mostly Almond, Apricot, Peach, Plum, *Elaeagnus angustifolius* var. *orientalis*, and, along the water channels, willows and *Populus euphratica*, with, in the richer orchards, splendid specimens of the small leaved elm, *Ulmus glabra* Mill. (not of all authors),

around the water reservoirs. Under the fruit trees are sown crops of wheat, barley, rye, cotton, or more frequently the whole space is sown with sainfoin (a north Persian variety, see the conspectus), with here and there a few plants of hemp, grown for the seed, to be strewn on bread, some castor oil plants of which the oil is used in primitive lamps and medicinally, and a little *Sesamum indicum*, likewise for the seed used as a condiment. The orchards are artificially irrigated and, being rarely if ever weeded, constitute veritable living museums in which may be found representatives of most of the flora of the countryside at a corresponding altitude within a radius of many miles. The spreading of seeds is doubtless greatly helped by violent wind and sand storms which occur in spring and autumn and which completely veil the sun.

Of the 1370 specimens collected by me between August 1925 and November 1929, and now mounted in the Kew Herbarium, a considerable number were found in gardens and orchards and in the desert hills to the south of Tabriz.

These hills are cut up into winding ravines running down in a north westerly direction from the outposts of the Sahand Range, and, with few exceptions, dry at all times of the year. They are probably the result of floods in past ages. Disastrous floods still occur from time to time. Two in the year 1928, on the 8th July and the 11th August, destroyed many thousands of the poorer homes, and damage was done to the irrigation system in orchards and in the town itself which it will take years to repair. The crops under the orchard trees were covered with a layer of sands and stones several feet deep and the bark of the trees themselves was cut off almost in a circle by the sharp stones brought down by the rushing water. The water rushed down the principal thoroughfares, bringing with it dead bodies of animals and in some cases of men and the debris of houses, including several mill stones and huge boulders. On both dates the centre of the cloud burst was somewhere up in the Sahand Range and the water came from the larger ravines which debouch in the neighbourhood of the Teheran Gate. Several villages situated along the lower reaches of the Zindjanab ravine, which is a permanent waterway and displays an exceedingly luxuriant vegetation, were completely wiped out. On the second occasion the actual rainfall in Tabriz was scarcely enough to freshen up the parched gardens and orchards. An elaborate system of dykes has since been planned and the work partially carried out.

Except in times of cloud bursts and consequent floods the ravine beds are dry and sun-baked. About the middle of the month of June it is not uncommon at a turn in a ravine to come across a stretch about a quarter of a mile long or slightly more, in which, for no immediately discernible reason—the soil is as dry here as in the rest of the desert hills—the monotony of the treeless and bushless and largely grassless landscape is broken by colonies of Mullein (*Verbascum speciosum*),

enormous clumps of golden yellow *Phlomis armeniaca* var. *subcordata*, of bright yellow *Onosma microspermum* Stev. or of the paler *Onosma bilabiatum* Boiss. et Buhse, and of white *Salvia sahendica*; large cushion-like masses of the white or pink *Acanthophyllum squarrosum*, interspersed with brilliant tufts of *Thymus Kotschyanus* and of the dark blue *Moltkia caerulea*, carpets of bright yellow *Scutellaria pinnatifida*, long stalked rosettes of ruby coloured *Helichrysum Eichwaldii* and still taller rosettes of the violet *Teucrium orientale*, and large colonies of the pink-purple *Stachys inflata* with silvery grey foliage, to mention a few only of the more showy plants in prime at about this season. Closer examination will generally reveal the existence of a small cornfield at either end of the stretch. Sheep have been refused access to this part of the ravine in order that the corn may not be disturbed, hence the profusion of flowering plants and of colours which would compete with those of any artificially prepared rockery. A few weeks later the corn will be cut, the sheep will do their worst, and little or nothing will remain of all this splendour.

While sheltered patches in the ravines are thus strewn with flowers the wind-swept ridges separating them are naturally planted out here and there with little clumps, knarled at their woody bases, of *Allochrusa persica*, whose white, cream-coloured or pink flowers, massed together on slender pedicels, appear to be for ever shivering, and are consequently difficult to photograph.

In July large purple thistles (*Onopordon heteracanthum*) provide a little colour—and also scent—in the hills to the south of Tabriz, after which all is grey-brown and sunbaked until autumn and late autumn, when various species of the *Chenopodium* family break the monotony with their crimson, ruby-coloured or orange infructescences, and a few plants of bright violet *Orobanche aegyptiaca* appear on the edge of ploughed patches. But little corn of any kind is grown on these hills. There is no system of surface irrigation up here; water is to be found, if at all, in subterranean passages often several hundred feet below the surface. These passages are called kanats. They all run in the direction of Tabriz, and access to them is had at regular intervals, for purposes of repair, by wells which, however, are continually silting up. The temperature in the kanats is frequently greater than at the surface and steam may be seen issuing from the crater-like mouths of the wells, around which delicate plants of *Aethionema arabicum* are often found to be clinging. The chief crop on the hills to the south of Tabriz is provided by the water melon which is planted over large tracts on the hill sides. It never attains any size, doubtless owing to the lack of water, but its fruit is very succulent.

The garden of the British Consulate at Tabriz resembles, in many respects, the orchards described above. During the four years which I spent at Tabriz I forbade any weeding to be done before 16th June, and in the case of the first two years, before mid-July.

I was thus able to observe the life cycle of most of the annuals and to note the date of commencement of flowering from year to year. In spite of climatic differences as between the different years, with few exceptions the dates of first flowering coincided very nearly, in some cases exactly, from year to year, and differences in early spring tended to disappear as that season drew to its close. Among my garden weeds Crucifers took a prominent place. In the systematic conspectus which figures below, prepared by Dr. W. B. Turrill, plants located as " near Tabriz " all grew, except where otherwise stated, in the Consulate Gardens.

A very small proportion of the collection comes from the Red Hills to the north of Tabriz, the flora of which I have scarcely touched. It differs considerably from that of the southern hills.

The flora around the Yam Pass, on the Tabriz-Djulfa road, and on the mountain known in Persian as Kuh-i-Mishou, and in Turki as Mishou Dagh, differs in many respects from that of the vicinity of Tabriz. Yam station is at 1786 metres above sea level, Tabriz at 1348 metres. The difference is therefore 438 metres higher in the case of Yam. The distance from Tabriz station to Yam station is about 50 kilometres. The rise occurs for the most part after Sofian (1381 metres above sea level), rather more than half way from Tabriz to Yam. After Sofian the landscape changes rapidly. Green meadows appear, and interspersed with the more typically Persian flora are to be found plants common in Europe, such as *Lythrum Salicaria* and *Orchis latifolia*, or cosmopolitans unknown around Tabriz such as *Prunella vulgaris*, until at Yam itself and the mountain meadows and damp grassy places on Mishou Dagh the British grass of Parnassus occurs in abundance, while *Juniperus communis* is abundant in the higher reaches of the mountain. Water is by no means scarce, and is of excellent quality. This area is not very extensive. From Yam station the Djulfa road drops in 8 kilometres to the town of Marand at 1299 metres above sea-level, at a lower level than Tabriz, very hot in summer, and famed for its excellent fruit, including apples and pears.

The more typically Persian flora in the Yam and Mishou area likewise differs from that of the neighbourhood of Tabriz. Here we have *Aethionema pulchellum*, instead of *Aethionema arabicum* and *A. cristatum* of Tabriz, *Jurinea pulchella* instead of *J. leptoloba*, *Onobrychis cornuta*, *Astragalus mishouensis* Turrill and colonies of the remarkable and ungainly *Michauxia laevigata*, all typical of the higher mountain regions. For further notes on this interesting region I must refer to the body of the Systematic Conspectus. Owing to their distance from Tabriz I have not been able to collect nearly so thoroughly in the Yam and Mishou areas as nearer home. It was, however, my custom to pitch my camp under Mount Mishou during the months of July, August, and part of September and to repair there for several days and nights every week. I have probably missed a good deal of the spring flora, including some bulbous plants. The typical bulb in late summer and early autumn on

Mishou Dagh and at Yam is the white, cream-white, and often faintly pink tinged *Colchicum Kotschyi*.

For notes concerning the plants collected in the Urmia district and in general west and south of Lake Urmia I must also refer to the body of the Conspectus. I was able to visit this district twice only, in each case during the latter half of May, in 1926 and 1928. The collection from this area is therefore necessarily meagre.

Seeds of nearly all the plants collected in the Tabriz area, and of many of those obtained in the Yam and Mishou area were likewise sent to Kew during the summers and autumns of 1927, 1928, and 1929.

Geographical Distribution and Phytogeographical Problems. W. B. Turrill.

The herbarium collection numbers 1,370 specimens and the total list consists of 699 species and 31 additional varieties. While the collection is not complete for all the species of central Azerbaidjan it must be considered as more representative than any other single collection made in the province because of the residence of the collector for several years and in all seasons. For this reason a phytogeographical analysis of the collection is likely to yield valuable facts concerning the distribution and origin of the Near Eastern flora.

The position of the province of Azerbaidjan is of special interest to the student of the Mediterranean flora. It is situated near the junction of the Central European (Caucasian Province), the Mediterranean (Armenian-Iranian Mediterranean Province), and the Central Asian (Turanian or Aralo-Caspian Province), floral Regions in the sense of Engler and Gilg [Syllabus der Pflanzenfamilien Aufl. 9 u. 10, 377-379 (1924)]. The flora is predominantly Mediterranean as proved by the general distribution of the chief genera and of many of the species but its detailed affinities are more diverse than those of the flora of a more centrally placed area of the Mediterranean Floral Region.

Stoyanoff [Journ. Ecol. xiv. 138 (1926)] develops the interesting theme that "during all the stages of the development of the European steppe flora direct immigration from the Mediterranean and its neighbouring countries may be more easily imagined than the often supposed migration in large numbers from the foot of the Altai, along a kind of relatively narrow corridor in Western Siberia." The migration of plants from and across Asia Minor into Europe has also been considered by many authors and the subject has been studied in detail by the present writer (The Plant Life of the Balkan Peninsula, Oxford, 1929, especially pp. 373-388, 481-482). Azerbaidjan is at the parting of the ways for "migrating" or extending species. To the south-west lie the more desert regions of Iraq, and Arabia, to the south-east the dissected Iranian plateau, to the north the high mountains of Armenia and the Caucasus, and to the west the diversified area of Asia Minor which in Tertiary and even early

Quaternary times led across Aegean land into Europe. Species extending westwards south of the Caspian from Afghanistan, Turkestan, or Persia, or eastwards into these countries, must for the most part include Azerbaidjan in their route under the existing climatic conditions of the countries immediately to the south. That there has been a considerable local development of the flora is indicated by the endemism of a relatively large number of species.

The largest family in the collection is that of the *Compositae* with 115 species and 4 additional varieties. *Labiatae* with 58 species and two additional varieties, *Leguminosae* with 57 species and one additional variety, *Cruciferae*, with 55 species and four additional varieties, *Caryophyllaceae*, with 38 species and one additional variety, *Gramineae* with 28 species and one additional variety, and *Umbelliferae* with 28 species are, in the order named, the families with the next most numerous species. The largest genus is *Astragalus* with 36 species. Some of the new species were described in an earlier paper published in Kew Bull. 1929, pp. 223 235, and one, *Fritillaria karadaghensis*, in the Gard. Chron. 3rd ser. lxxxv. 242, 221 (1929). Including these the collection has 23 species and 17 varieties which are described as new.

In analyzing the geographical distribution of the species in the collection those having smaller areas of distribution have been classified into a number of categories. A wide experience has shown that it is often the species with more limited distribution which indicate phytogeographical affinities most clearly.

Widely distributed species. Many of these are weeds of cultivation and have no doubt been partly distributed with crop plants. It is, however, of interest to note that the following wild species are placed under this category. *Silene vulgaris* Garcke, *Myricaria germanica* Desv., *Lotus corniculatus* L., *Vicia tenuifolia* Roth, *Potentilla reptans* L., *Poterium Sanguisorba* L., *Parnassia palustris* L., *Sedum album* L., *Lythrum Salicaria* L., *Epilobium hirsutum* L., *Falcaria Rivinii* Bernh., *Galium tricorne* Stokes, *G. verum* L., *Rubia tinctorum* L., *Campanula glomerata* L., *Glaux maritima* L., *Prunella vulgaris* L., *Salsola Kali* L., *Rumex Acetosella* L., *Juniperus communis* L., and *Cystopteris fragilis* Bernh. The majority of these even occur in the British flora.

Species extending into Europe. No less than 312 of the species extend their distribution into Europe. This number, of course, includes many widely distributed, and even practically cosmopolitan species. However, bearing in mind the important Oriental (in the sense of Boissier) contribution to the European flora, the fact that the following species extend from Azerbaidjan into Europe, even if only into the Balkan Peninsula, is of considerable significance: *Delphinium orientale* Gay, *Ranunculus constaninopolitanus* D'Urv., *R. oxyspermus* M. Bieb., *Fumaria Schrammii* Vel., *Roemeria hybrida* DC., *Aethionema arabicum* Andrz., *Alyssum linifolium* Steph., *Brassica*

elongata Ehrh., *Ruta Buxbaumii* Poir., *Sophora alopecuriodes* L., *Galium coronatum* S. et S., *Echinops viscosus* DC., *Centaurium turcicum* Ronn., *Gentiana ciliata* L., *Lycium ruthenicum* Murr., *Phlomis pungens* Willd., and *Orchis iberica* M. Bieb. The distribution of the above, and of a considerable number of other species, undoubtedly represents, for the most part, a migration (extension) westwards, though the possibility that some have extended eastwards must not be forgotten. It may be recalled that the writer has clearly shown that the extension of species eastwards in the Mediterranean Region, at least in South Europe, has been much less important than extension westwards. For example, the floristic affinities of the Balkan Peninsula are much closer, on the whole, with Asia Minor than with the Italian and Iberian Peninsulas (see Turrill, The Plant Life of the Balkan Peninsula, pp. 373 *seq.*). Moreover, many important genera, or sections of genera of the Mediterranean flora, have their chief centre of development in the Orient but extend westwards, as, for example, *Astragalus*, while those with their most important development in the west do not extend far to the east, as *Ulex*, or have only a few species in the Eastern Mediterranean Basin and these not extending into the east of the Region, as, for example, *Cistus*. It seems established that many species, or their immediate ancestors, reached Europe by extending through Asia Minor and across the Aegean and thence through the Balkan Peninsula into Central Europe or the Mediterranean Basin. Further, that a connection between the Central Asiatic and European floras may be traced through Asia Minor adds to the phytogeographical importance of the flora of Azerbaidjan.

Species common to the Orient and to Central Asia but not recorded for Europe. It is not inconsistent with the conclusions just drawn that a considerable number of species occur in Azerbaidjan and also in Central Asia but have not extended to Europe. It would require much detailed study of each species individually to be able to suggest what were the limiting factors to further extension. Physiographical, climatic, or edaphic barriers, causing a wide extent of unfavourable habitat conditions, and insufficient age of the species to have spread so far are probably the most important. Distribution of pollinating insects and unsuccessful competition with other species and in closed plant communities are others.

It will be noted, in the detailed distributions given in the Systematic List, that Azerbaidjan is sometimes in the centre, sometimes on the western edge of the area occupied by the species in this category. We are here concerned with 34 species, of which the distributions of the following are typical: *Anemone biflora* DC., *Roemeria refracta* DC., *Euclidium tataricum* DC., *Goldbachia torulosa* DC., *Sisymbrium nudum* Boiss., *Viola occulta* Lehm., *Lepyrodiclis holosteoides* Fenzl., *Biebersteinia multifida* DC., *Astragalus commixtus* Bunge, *Lactuca orientalis* Boiss., *Campanula simplex* Stev., *Ziziphora clinopodioides* M. Bieb., *Z. tenuior* L., and *Eremurus anisopterus* Regel.

In addition to the above attention should also be called to the *Chenopodiaceae* inhabiting saline habitats in Azerbaidjan. Not only is Lake Urmia salt but salt areas of greater or less extent are common. It is probable that many of the members of the flora of saline terrain extended to Azerbaidjan, and sometimes beyond, from Central Asia. Thus *Petrosimonia glauca* Bunge came from the east around the southern part of the Caspian Sea ; *Anabasis aphylla* L., *Salsola brachiata* Pall. and *S. spissa* M. Bieb. have extended to S. Russia ; *Halocnemum strobilaceum* M. Bieb. is distributed from Central Asia to the Mediterranean Region ; and several species have differentiated from Asiatic affinities within the area of the Armenian-N. Persian flora.

Species with wide or fairly wide distribution in the Orient but not reaching Europe or Central Asia. 146 species are included in this category. They represent the typical Oriental element in the Flora of Azerbaidjan and therefore support the statement that the flora is essentially Mediterranean. The majority are species of genera limited to or with a chief centre of development in the Mediterranean Region. The following species are characteristic of those placed under this heading : *Delphinium cappadocicum* Boiss., *Fumaria asepala* Boiss., *Papaver macrostomum* Boiss. et Huet, *Clypeola lappacea* Boiss., *Conringia clavata* Boiss., *Isatis glauca* Auch.-Eloy, *Acanthophyllum squarrosum* Boiss., *Dianthus crinitus* Smith, *Linum mucronatum* Bertol., *Astragalus odoratus* Lam., *Scabiosa rotata* M. Bieb., *Cirsium apiculatum* DC., *Echinops persicus* Stev., *Acantholimon venustum* Boiss., *Nonnea melanocarpa* Boiss., *Globularia trichosantha* Fisch. et Mey., *Nepeta micrantha* Bunge, *Phlomis armeniaca* Willd., *Thymus Kotschyanus* Boiss. et Hohen., and *Paronychia kurdica* Boiss.

A number of other species most of which should strictly have been counted with the above have been kept separate since their distributions give special indications of their places of origin :

Hesperis persica Boiss. Armenia, Kurdistan, Persia.
Acanthophyllum mucronatum C. A. Mey. Caucasus, Armenia, N. Persia, Transcaspia.
Reaumuria hypericoides Willd. Caucasus, Persia, Caspian district.
Hypericum asperulum Jaub. et Spach. Iraq, Persia.
Astragalus Caraganae Fisch. et Mey. Iraq, Armenia, N. and W. Persia, Talysch.
Ferula ovina Boiss. Persia, Baluchistan.
Lisaea heterocarpa Boiss. Iraq, N. and Cent. Persia.
Malabaila Aucheri Boiss. Iraq, N. and Cent. Persia.
Prangos uloptera DC. Iraq, Persia, Armenia.
Galium leiophyllum Boiss. Armenia, Kurdistan, N. Persia.
Pterocephalus canus Coult. Persia, Kurdistan.
Echinops descendens Hand.-Mazz. Military zone between Iraq and Syria.
Campanula sclerotricha Boiss. N. and W. Persia, Kurdistan.

Primula auriculata Lam. Bithynian Olympus through Asia Minor and the Caucasus thence N.W. and S. to Persia.
Veronica intercedens Bornm. Kurdistan.
Salvia Hydrangea Benth. N. Persia, Kurdistan.
Stachys inflata Benth. Caucasus, Iraq, Persia.
Petrosimonia glauca Bunge. N. Persia and shores of the Caspian Sea.
Polygonum luzuloides Jaub. et Spach. N. Asia Minor, Armenia, N. and W. Persia.
Euphorbia orientalis L. Armenia, Kurdistan, Persia.
Bellevalia ciliata Nees. Caucasus, Persia, Afghanistan.

It will be noted that the above species indicate floristic relationships with the Caucasus and Armenia, with Iraq, with eastern Asia Minor, and with Baluchistan.

Species known only from the Caucasus (sensu lato), Armenia, and N. Persia. This group is important because the majority of those species with more limited distributions belong to it. Indeed, judging from the present collection, the narrower affinities of the flora of Azerbaidjan are predominantly with the floras immediately to the north and north-west, and not with the flora of Central and South Persia. There must, indeed, be either a sudden or a gradual transition somewhere in western Persia between the Armenian-Transcaucasian-Azerbaidjan flora and that of the warmer parts of Persia. The details of this transition have still to be investigated. The phytogeographical position of the Caucasian flora cannot be further commented upon here except to say that Boissier's inclusion of it in his *Flora Orientalis* is extraordinarily convenient.

In the present category 83 species of the collection have been placed and these include: *Aquilegia olympica* Boiss., *Delphinium speciosum* M. Bieb., *Papaver desertorum* Grossh., *P. orientale* L., *Acthionema trinervium* Boiss., *Alyssum Muelleri* Boiss. et Buhse, *Chorispora iberica* DC., *Crambe juncea* M. Bieb., *Fibigia suffruticosa* Sweet, *Lepidium persicum* Boiss., *L. vesicarium* L., *Polygala Hohenackeriana* Fisch. et Mey., *Silene commelinaefolia* Boiss., *Ruta villosa* M. Bieb., *Rhamnus Pallasii* Fisch. et Mey., *Astragalus macrourus* Fisch. et Mey., *A. podocarpus* C. A. Mey., *Vicia persica* Boiss., *Chaerophyllum macrospermum* Fisch. et Mey., *Hippomarathrum crispum* Koch, *Reutera aurea* Boiss., *Asperula trichodes* Gay, *Crucianella chlorostachys* Fisch. et Mey., *Carduus onopordioides* Fisch., *Centaurea Glehnii* Trautv., *Cirsium Szovitsii* Boiss., *Microlonchus oligochaetus* Boiss., *Phaeopappus leuzeoides* Boiss., *Michauxia laevigata* Vent., *Syringa persica* L. *Veronica microcarpa* Boiss., *Eremostachys Tournefortii* Jaub. et Spach, *Salvia limbata* C. A. Mey., *Stachys fruticulosa* M. Bieb., *Salsola glauca* M. Bieb., *Iris reticulata* M. Bieb., and *Allium akaka* Gmel.

Species found only in Persia. The species placed here number 45 and many of them do not extend far over the southern borders of

the province. With the 44 endemics of Azerbaidjan they form a group of 89 Persian species which give a local facies to the flora. The following may be mentioned by name as examples: *Corydalis Boissieri* Prain, *Alyssum lanigerum* DC., *Astragalus chrysotrichus* Boiss., *Asperula bracteata* Grossh., *Celsia persica* C. A. Mey., *Linaria lineolata* Boiss., and *Nepeta longiflora* Vent.

It may be pointed out here that the flora of Central Azerbaidjan is markedly different from that of Talysch and of the Elburs range, in spite of its geographical proximity to the former. Judging from Grossheim's account of the vegetation of Talysch [Flora Talysh, Tiflis 1926, and in Beih. Bot. Centrlbl. xliii. ii. 1 (1926)] the plant communities are also essentially different.

Endemics. 44 of the species in the collection are at present known only from the province of Azerbaidjan and 23 of these have been described as new. The majority of the endemics are morphologically very closely allied to species already known from Azerbaidjan or at least from Persia, Armenia, or Transcaucasia. Presumably, therefore, the majority are relatively novitiate species rather than relicts. The majority of the varieties have a decidedly smaller area of distribution than the whole species and the endemism of some of them suggests a preliminary to the segregation of the species into two or more.

Summary. The phytogeographical analysis has indicated that the flora of Azerbaidjan is Mediterranean-Oriental and that its closest affinities are with Armenia and Transcaucasia to the north and northwest and not with Central and South Persia.

Cultivated plants and weeds. In the systematic list below a number of cultivated plants and weeds of cultivated ground are included. In addition the following cereals and legumes have been cultivated at Kew from seeds received from the Tabriz district through Gilliat-Smith.

Secale cereale *L.* Coudar (Caudar). Generally sown in the autumn.

Triticum vulgare *Host* var. **turcicum** *Körn.* or var. **pseudo-turcicum** *Hakob.* Qizilqin Boghda of Hashdari (Hasht-Rud).

Triticum vulgare *Host* var. **Hostianum** *Körn.* Qirmizi Boghda = Red wheat. Sown in the spring. The same variety is also said to be sown in the autumn.

Triticum vulgare *Host* var. **graecum** *Körn.* Agh Boghda White wheat. Sown in the autumn.

Hordeum distichon *L.* Arpa in Turki, Džou in Persian. Džov in all gypsy dialects, but in some it has come to mean oats.

Lens esculenta *Moench,* var. **nummularia** *Alef.* Landwirthschaftliche Flora 57 (1866).

Cicer arietinum *L.* var. **fuscum** *Alef.* l.c. Known as Qirmizi Nohut, i.e. Red Chickpea or as Gara Nohut, i.e. Black Chickpea.

We have to thank Prof. J. Percival of Reading for determining the cereals in the above list.

The importance of the study of weeds when considering the origin of cultivated plants has been emphasized by many writers, notably by Vavilov in his Studies on the Origin of Cultivated Plants, Leningrad 1926. Not only have important crops been obtained from weeds growing with other crops, but a study of the weed flora may indicate the immediate place of origin of the seed used for sowing a given field [see Stapledon in Journ. Board Agric. xxiii. 105 (1916)], and an exhaustive research of weeds constantly accompanying a given crop may at least suggest the area whence the crop was first distributed to other lands. It is therefore probable that the weeds included below have more than a local interest, because, as is stated for so many, they occur not only in cultivated ground, fields, or gardens, but also on the hill-slopes or in other natural habitats. In such an area as Azerbaidjan it is possible to see the persistence of certain weeds under conditions of cultivation, and the introduction of others into cultivated land from the natural plant communities. That, for example, many species of the family *Cruciferae* but not of the genus *Astragalus* survive and flourish as garden and field weeds shows the selective action of cultivation.

Systematic List.

W. B. Turrill, with field notes and vernacular names by B. Gilliat-Smith.

The determinations of the plants enumerated below have been made at Kew by comparison with original or well authenticated descriptions and, wherever possible, with type or authentic herbarium material. Sometimes comparison with the original description alone has had to suffice for identification; rarely the original description has not been available and a reference is then given to any other publication which has been used. Apart from such species, synonyms and additional references are only given where they aid in clarifying taxonomic ambiguities. The works of Boissier, Bornmüller, and Grossheim have been constantly used.

The assistance of specialists is acknowledged under certain species and in addition our thanks are due to Prof. Babcock for checking the determinations of *Crepis* and *Pterotheca*, to Mr. Pugsley for checking those of *Fumaria* and *Euphrasia*, and Prof. Sirjaev those of *Trigonella*.

Question marks indicate either that the material is faulty or that the genus, or section of a genus, needs detailed taxonomic revision.

The appended field notes on colour of flowers, scent, and other data are all made from living material. Vernacular names and notes on uses can only be trustworthily obtained by a resident with a knowledge of the language: for that reason those Turki and Persian names and uses given below must be considered exceptionally valuable.

Adonis aestivalis *L.* Sp. Pl. ed. 2.771 (1792).

Near Tabriz, garden and cornfield weed, flowers red, 26.4.26, No. 1414; 24.4.27, No. 1925. Flowers during the latter end of April and in May.

Distrib. S. and Cent. Eur., N. Afr., Orient east to Persia.

Anemone biflora *DC.* Syst. i. 201 (1818).

Mou Deh, May 1929, No. 2495.

Distrib. Persia, Baluchistan, Afghanistan, Turkestan, Cent. Asia.

Aquilegia olympica *Boiss.* in Ann. Sci. Nat. Ser. II. xvi. 360 (1841).

Brook side under Mishou Dagh, 25.7.29, No. 2582.

Distrib. Armenia, Caucasus, N. Persia.

Ceratocephalus falcatus *Pers.* Syn. i. 341 (1805).

Tabriz, garden weed, 31.3.26, flowers yellow, No. 1331; common everywhere, 9.4.26, No. 1357; 26.4.26, No. 1419: hills to the south, 27.3.27, No. 1921. Flowers March to May.

Distrib. S. and Centr. Eur., Orient east to N. India.

It is doubtful if the varieties given by Boissier [Flor. Or. i. 58 (1867)] are more than habitat forms. The last specimen quoted above, No. 1921, answers to Boissier's description of his var. *exscapus*, since it consists of very small tomentose plants with the flowers practically sessile. Several of the specimens are so young as to make exact determination not quite certain.

Delphinium acutilobum *Turrill* in Kew. Bull. 1929, 223.

Near Yam, 21.8.27, No. 2086; Yam, 7.28, No. 2365; 7.28, No. 2388. Flowers pale violet, in late July and throughout August. Cultivated at Kew, as K. 675, 1928.

Endemic.

D. cappadocicum *Boiss.* in Ann. Sci. Nat. Ser. II. xvi. 367 (1841); Flor. Or. i. 81 (1867).

Near Tabriz, garden weed, 20.6.27, flowers violet-mauve, No. 1916. Cultivated at Kew as K. 685, 686, 31.7.28. Flowers June, July, and August.

Distrib. Cappadocia, N. Syria, Iraq, Armenia, N. Persia.

One other specimen, No. 1734, Tabriz, 6.26, is either this species or one very closely related to it and not yet described. It consists of one drawn-out shoot with about half-a-dozen well spaced, long pedicelled flowers.

D. divaricatum *Ledeb.* in Eichw. Casp. 16, t. 16 (1831-33), var. **Gilliatii** *Turrill* var. nov.; a planta vulgare caule inferne breviter patule pubescente, floribus leviter minoribus fere concoloribus (in siccitate) distinguitur.

Near Tabriz, garden weed, 15.6.27, flowers violet-blue, No. 1917. Flowers from the middle of June to the middle of November when the weather permits.

Distrib. (of var.) endemic.

Distrib. (of sp.) S.E. Eur., Russia, Caucasus, Armenia, Turcomania, N. Persia.

This species is the eastern representative of the European and N. Asian *D. Consolida* L. which extends as far east as Asia Minor (Lycia and Phrygia). It is best distinguished by the adpressed hairs on the follicles. It is at present uncertain if the characters of the variety described above are constant, but the dried specimen with its smaller, darker, and almost uniformly coloured flowers has a different appearance from any others at Kew.

D. halophilum *Huth* in Engl. Bot. Jahrb. xx. 487 (1895). *D. Freynii* Huth l.c. 372 non Conrath. *D. laxiflorum* Freyn ex Stapf in Denkschr. Math.—Naturwiss. Cl. K. Akad. Wiss. Wien li. 25 (1886).

Near Tabriz, 6.7.26, flowers pale mauve, creamy, sometimes purplish, Nos. 1724, 1763; hills to the south of Tabriz, 19.6.27, No. 1914. Flowers end of June, July, and part of August.
Distrib. Persia.

The group to which this species belongs is a very critical one and it is unfortunate that the key provided by Huth is useless for distinguishing the species. The nearest affinity of our plants is to *D. persicum* Boiss. in Ann. Sci. Nat. Ser. II. xvi. 362 (1841). The type of this is *Aucher-Eloy* 78 from near Amadan. It is accurately described as having the stem covered " indumento brevi patulo sparso viscidulo." Unfortunately in the Flor. Or. i. 76 (1867) this description is altered to " adpressiuscule glanduloso-pubescens." *D. halophilum* has a grey adpressed not viscid indumentum. This as well as the longer pedicels also distinguishes it from *D. rugulosum* Boiss. which was based on *Aucher-Eloy* 4028, from near Lake Urmia.

In addition to Aucher-Eloy's and Freyn's types and Gilliat-Smith's plants there is at Kew a rather poor specimen from Bunge, " pr. Sser-tschah Persiae mediae orientalis. Mart. 1859," and one specimen, without locality, ex herb. Trautvetter leg. Radde, mounted with a specimen of *D. persicum*, which I place under *D. halophilum*.

The amount of branching is a character of no taxonomic importance, since Gilliat-Smith's specimens range from simple to much branched plants.

D. orientale *Gay* in Desm. Catal. Dord. 12 (1840).

In gardens near Tabriz, 5.26, faintly scented, flowers violet-purple, No. 1575; 19.5.27, No. 1915; cultivated at Kew as K. 414 from Tabriz seed, and in fruit 14.8.28. It flowers from the middle of May to July. In the fields there were some plants with pink flowers instead of the more usual violet-purple flowers. Under cultivation at Kew it increases very much in size and is very floriferous.
Distrib. Hungary, Balk. Penins., N. Afr., Orient east to Afghanistan.

D. speciosum *M. Bieb.* Flor. Taur.-Cauc. ii. 12 (1808).

Above Zindjanab, Sahand Range, 25-27.6.29, flowers large, blue with slight violet tinge, No. 2514.
Distrib. Caucasus, Armenia, N. Persia.

Nigella arvensis *L.* Sp. Pl. 534 (1753).

Cultivated in garden, Tabriz, 8.28, flowers green-white or blue-white, No. 2466. Known locally as "Gara tschörek oti," i.e. "Black bread weed." The seeds are used sprinkled on bread and the plant is cultivated for this purpose.

Distrib. Cent. Eur. and Medit. Region.

The specimen is too young to determine the variety.

N. damascena *L.* Sp. Pl. 534 (1753) var. floribus semiplenis.

Near Tabriz, cultivated as a garden plant, 6.7.26, flowers sky blue, No. 1660.

Distrib. S. Eur., N. Afr., Asia Minor, Cyprus.

Ranunculus arvensis *L.* Sp. Pl. 555 (1753).

Near Tabriz, 25.4.26, No. 1402; weed in garden, 2.5.26, No. 1467; Mishou Dagh, 22.5.27, No. 1794; near Tabriz, 1.5.27, No. 1922.

Distrib. S. and Cent. Eur., N. Afr., Orient east to India.

R. constantinopolitanus *D'Urv.* in Mém. Soc. Linn. Par. i. 317 (1822).

Mishou Dagh, in rich fields, 22.5.27, No. 1923.

Distrib. E. Balk. Penins., Asia Minor, Armenia, Persia, and (as var. *palaestinus* Boiss.) south to Syria and Palestine.

R. oxyspermus *M. Bieb.* in Willd. Sp. Pl. ii. 1328 (1800).

South of Tabriz, a garden weed, 29.4 26, No. 1448; near Tabriz 5.27, No. 1920. Flowers from mid-April to end of May.

Distrib. Balk. Penins., Caucasus, Armenia to Persia.

Ranunculus sp. Rich fields near Mishou Dagh, 22.5.27, No. 1924.

Ranunculus sp. Stream under Mishou Dagh, 8.29, No. 2612.

The specimen belongs to the *R. acris* group but is too poor to determine.

Thalictrum elatum *Jacq.* Hort. Vindob. iii. 49 (1776).

At Seivan near Yam, 24.6.28, No. 2344.

Distrib. E.N. Tempt. Region.

Some of the leaves have stipels.

Berberidaceae.

Berberis densiflora *Boiss. et Buhse* Aufz. 9, t. iii. f. 2. (1860).

N.E. of Tabriz, cultivated as a tree, in young fruit, 6.28, No. 2393; Zindjanab torrent, hills south of Tabriz, 27.6.29, No. 2573. Also cultivated and the berries sold in the bazaars.

Distrib. Armenia, N. Persia, Turkestan, Baluchistan.

Leontice minor *Boiss.* Flor. Or. i. 100 (1867).

West of Zandjan, 3.5.28, flowers bright yellow, No. 2247.

Distrib. N. Persia.

Corydalis Boissieri *Prain* in Bull. Herb. Boiss. vii. 172 (1899).
Kara Dagh, north of Tabriz, coll. *Egger*, spring 1927, No. 2175.
Distrib. Persia.

Fumaria asepala *Boiss.* Flor. Or. i. 135 (1867).
Valley of Livan, 9.25, No. 1290 (?); hills south of Tabriz, 5.5.26, white flowers, No. 1475; near Tabriz, garden weed, 5.26, flowers white, No. 1497 pro parte; 12.5.27, flowers white, No. 2077.
Distrib. Asia Minor, Syria, Iraq, Persia.

F. Schrammii *Vel.* Flor. Bulg. 22 (1891).
Near Tabriz, garden weed, 5.26, pink flowers, No. 1497 pro parte.
Distrib. S. and Cent. Eur., Asia Minor, Armenia, Transcaucasia, Persia, Turkestan, Cent. Asia, N. India.

F. Vaillantii *Lois.* in Desv. Journ. Bot. ii. 358 (1809).
Near Tabriz, garden weed, 26.4.26, flowers pink, No. 1413.
Distrib. Cent. and S. Eur. east to Baluchistan, Afghanistan, Cent. Asia, and N. India.

Glaucium corniculatum *Curt.* Flor. Lond. vi. 6, t. 32 (1817) var. **phoeniceum** *DC.* Syst. ii. 96 (1821).
Near Tabriz, 5.26, flowers red with blue-black blotches at base of petals, No. 1512; east of Lake Urmia, 5.26, No. 1600; near Tabriz, 5.26, No. 1601; garden near Tabriz, 5.6.29, No. 2538.
Distrib. (of var. and species) Medit. Region; often an escape in Cent. Eur.

G. grandiflorum *Boiss. et Huet* in Boiss. Diagn. Ser. II. v. 15 (1856).
Garden near Tabriz, 5.29, flowers deep red sometimes verging to brick red with blue-black blotches at base of petals, No. 2539; Shor Dara (Dere), 11.5.28, No. 2298.
Distrib. E. Medit. Region.

Hypecoum pendulum *L.* Sp. Pl. 124 (1753).
Tabriz, garden weed, 9.4.26, flowers yellow, No. 1358; 5.26, No. 1389; 26.4.26, No. 1416; 2.5.26, Nos. 1471, 1472; hills south of Tabriz, 13.4.27, No. 2057. Flowers from mid-April to June and July.
Distrib. S. Eur. and Orient east to N. India.

Papaver Argemone *L.* Sp. Pl. 506 (1753).
Near Tabriz, garden weed, 11.5.27, flowers red, No. 2055.
Distrib. Cent. and S. Eur., N. Afr., Orient east to Persia.

P. caucasicum *M. Bieb.* Flor. Taur.-Cauc. ii. 5 (1808) var. **stenocarpum** *Boiss.* Flor. Or. i. 110 (1867).
Mishou Dagh, 12.7.28, flowers pale brick red, No. 2387.
Distrib. (of species) E. Asia Minor, Caucasus, Persia.
(of var.) Armenia, Persia.

P. desertorum *Grossheim* Plantae orientales exsiccatae, No. 85 (1924).

Tabriz, garden weed, 24.5.26, flowers red, No. 1452.

Distrib. Armenia, N. Persia.

This species is in some respects intermediate between *P. Argemone* L. and *P. hybridum* L. Grossheim's type is from near Erivan, dist. Nachitshevan, in mont. Darry-Dagh.

P. dubium *L.* Sp. Pl. 1196 (1753).

This species [sensu Fedde in Pflanzenr. iv. 104. 315 (1909)] is a very puzzling one and until wide field studies have been made and correlated with the results of breeding experiments and cytological examination it is doubtful if any taxonomic scheme will have much value. In the main I have followed Fedde's nomenclature.

Near Tabriz, garden weed, 29.4.26, flowers red, No. 1455. So far as can be judged from the solitary specimen this is not to be distinguished from European plants accepted as *P. dubium* L.

Near Tabriz, 5.26, No. 1508; 13.5.27, No. 2056; garden near Tabriz, 5.29, No. 2540; cultivated at Kew from Tabriz seed as K. 445. These plants are the var. *laevigatum* Elkan (*P. laevigatum* M. Bieb.) subvar. *setulosum* Fedde et Bornm. in Pflanzenr, iv. 104, 318 (1909).

Hills to the south of Tabriz, 5.27, No. 2054. This is considered a new subvariety (or form). It is provisionally termed *P. dubium* L. var. *laevigatum* Elkan subvar. *nanum* Turrill foliis omnibus basilaribus vel fere basilaribus, pedunculis unifloris 11 cm. longis vel minus. From the data available it appears to be an ecad, its habit being correlated with its dry environment on hill-slopes. Whether it is a mere habitat form or a genetical ecotype is quite uncertain. The dwarf specimens with leaves aggregated at the base of the one-flowered peduncles have a peculiar general habit. The leaves have distinct bristle-hairs, the peduncles are densely adpressly setose, and the buds spreadingly so.

Distrib. (of species s. l). East N. Temp. Region.

P. macrostomum *Boiss. et Huet* in Boiss. Diagn. Ser. II. v. 15 (1856).

Near Tabriz, 5.26, flowers dark red with black blotches at base of petals, No. 1510; hills south of Tabriz, 9.6.28, Nos. 2276, 2297, the latter a var. or forma *albomarginatum*; hills south of Tabriz, 6.29, No. 2536; cultivated at Kew from Tabriz seeds as K. 451 and as 38/1927, in flower 23.7.28. Flowers in nature from latter half of May to end of June.

Distrib. Cent. Asia Minor, Iraq, W. and N.W. Persia.

P. orientale *L.* Sp. Pl. 508 (1753).

Mishou Dagh, high up, 19.7.28, bright scarlet with black blotch at base, No. 2362 (ad *P. bracteatum* Lindl. vergens); Zindjanab, end of June 1929, No. 2537.

Distrib. Armenia, Caucasus, N. Persia.

The specimens, under No. 2362 and apparently all from one plant, are exceedingly interesting. One peduncle immediately under the young fruit is crowned with bracts, the remainder (three) have no bracts. One fruit has 18 stigmatic rays, another has only 12. It would appear that the distinction between *P. orientale* L. and *P. bracteatum* Lindl. breaks down taxonomically. Both "species" are distributed from the Caucasus to N. Persia.

P. Rhoeas *L.* Sp. Pl. 507 (1753) var. **caudatifolium** *Fedde* in Pflanzenr. iv. 104, 297 (1909).

In the garden of the old British Consulate, Tabriz, 6.7.26, Nos. 1648, 1681 (perhaps introduced). The petals of No. 1648 have, in the dried specimens, pale blotches at the bases.

Distrib. (of species and var.) E. N. Temp. Region.

P. somniferum *L.* Sp. Pl. 508 (1753).

Near Tabriz, 6.7.26, No. 1676. The plant has spreading bristles on the flower stalk and 9 to 12 rays to each ovary.

Distrib. (of species) S. Eur. east to China and N. India, often an escape from cultivation.

P. somniferum L. var. **leptocaulotum** Fedde in Pflanzenr. iv. 104, 342 (1909).

Near Tabriz, 18.7.27/ No. 1994.

Distrib. (of var.) Asia Minor, Armenia.

Papaver somniferum *L.* var. **collinum** *Turrill* var. nov.; a var. *leptocauloto* Fedde pedunculis setulosis setis numerosis valde adpressis, capsulis breviter stipitatis distinctissima videtur.

Planta herbacea, caulibus ad 2·4 dm. altis a basi valde ramosis. *Folia* ambitu oblonga, pinnati-lobata, amplexicaulia, distinctissime glauca, glabra. *Pedunculi* setis numerosis valde adpressis dense obtecti. *Sepala* glabra. *Petala* purpurea exteriora usque ad 5·5 cm. longa et 8·5 cm. lata haud vel vix nigro-maculata, interiora minora circiter 4·5 cm. longa et 4·7 cm. lata nigro-maculata intus albo-glaucescentia. *Capsulae* immaturae lobis stigmaticis 11 instructae, 1·5 cm. longae, 6–7 diametro, glabrae, breviter stipitatae.

Hills south of Tabriz, 6.29, flowers bright red, No. 2535.

It is with some hesitation that a new variety of the polymorphic *P. somniferum* is described. The specimen has, however, flowers and young fruits, and apparently was collected growing wild. The number of stigmatic rays agrees with the number usually found in *P. somniferum* and serves to distinguish our plant from varieties of *P. setigerum*.

Papaver sp. nov. ?

North-west of Lake Urmia, 5.26, flowers brick red, No. 1550.

It is unfortunate that the material under this number is insufficient to form the basis of a proper description of what appears to be a new species. The alliance is certainly with *P. persicum* Lindl. but

the adpressed white hairs to the capsules and the much more depressed stigmata prevent it being included under this species. Fedde, Pflanzenr. iv. 104, 347 (1909), describes a species from the Erzingham district, Armenia, as *P. Bartuschianum*, which must also be near our plant but, e descriptione, differs in having quite glabrous stems and pedicels.

Roemeria hybrida *DC.* Syst. ii. 92 (1821).

Near Tabriz, 26.4.26, flowers, blue-purple or purple-violet, No. 1409 (typica) ; garden weed, 29.4.26, No. 1451 [var. *eriocarpa* DC. Syst. ii. 93 (1821)] Flowers from the end of April and during May.
Distrib. Medit. Region.

R. refracta *DC.* Syst. ii. 93 (1821). *R. rhoeadiflora* Boiss. Diagn. Ser. I. vi. 7 (1855) et Flor. Or. i. 119 (1867).

Near Tabriz, garden weed, 29.4.26, Nos. 1453, 1454 ; 5.26, Nos. 1509, 1611. One specimen under No. 1454 and No. 1611 are the var. *albomarginata* Fedde. Cultivated at Kew from Tabriz seed, as K. 400. Two of the specimens have setose fruits. K. 400 seed was also grown by the late L. A. M. Riley at North Warnborough, Hants, and three distinct types of plants were raised by him.

a. blue-purple flowers, stiff hairs on capsules.
b. scarlet-black blotches on petals, smooth capsules.
c. late flowering, scarlet flowers, leaves finely dissected.

Flowers, at Tabriz, from the first week in May to mid-June, always red.
Distrib. Caucasus, Armenia, Persia, Afghanistan, Baluchistan, Turkestan, Cent. Asia.

Cruciferae.

Aethionema arabicum *Andrz.* ex DC. Syst. ii. 560 (1821).

Hills south of Tabriz, 2.5.26, No. 1460 ; near Tabriz, 6.27, No. 1806. Normally in flower during April and May, flowers pink. Cultivated at Kew from Tabriz seed, 29.6.28.
Distrib. Thrace, Asia Minor, Syria, Armenia, Transcaucasia, N. Persia.

A. carneum *B. Fedtschenko* in Acta Hort. Petrop. xxiii. 428 (1904), *Thlaspi carneum* Soland. in Russell Nat. Hist. of Aleppo ii. 257 (1794). *Aethionema cristatum* DC. Syst. ii. 560 (1821).

Urmia district, 5.26, No. 1566 ; near Tabriz, 6.27, flowers pink, No. 1805.
Distrib. Syria and Palestine east to Persia, Afghanistan and Turcomania.

A. fimbriatum *Boiss.* in Ann. Sci. Nat. Ser. II. xvii. 193 (1842).

Urmia district, 5.26, No. 1540. The flowers are a very beautiful pink.
Distrib. N. Persia.

A. pulchellum *Boiss. et Huet* in Boiss. Diagn. Ser. II. v. 43 (1856).

Urmia district, 20.5.26, Nos. 1544 (small flowers), 1551 (medium sized flowers). Also common in the higher districts of Sir, Yam, etc. Flowers of various shades of pink and very showy.

Distrib. Armenia, E. Asia Minor, Persia.

There is a considerable range in the size of the flowers and since no ripe fruits are present on these specimens the identifications remain a little doubtful.

A. trinervium *Boiss.* Flor. Or. i. 342 (1867).

Mishou Dagh, flowers white, 22.5.27, No. 1793.

Distrib. Armenia, Transcaucasia, Persia.

Aethionema sp.

Near Tabriz, 5.27, No. 2130.

Alyssum bracteatum *Boiss. et Buhse* Aufz. 18 (1860).

Hills south of Tabriz, 2.5.26, flowers yellow, No. 1465 ; 5.26, No. 1504 : 5.26, No. 1627 ; 5.26, No. 1689.

Distrib. Armenia, Persia.

No. 2588, from Mushou Dagh, 5.8.29, is probably a variety or form of this species but the material is too imperfect to be certain.

A. campestre *L.* (Syst. ed. x. 1130 (1759).

Near Tabriz, garden weed, 9.4.26, flowers yellow, No. 1355 ; 26.4.26, No. 1410 ; hills to the south of Tabriz, 2.5.26, No. 1464 ; near Lake Urmia, 5.26, No. 1605 ; garden weed, 5.27, Nos. 1784, 1785, 1789 ; hills south of Tabriz, July 1929, No. 2529 [a mixture of var. *genuinum* Boiss. (C), var. *micranthum* Boiss. (A. and B.), and intermediates between them (D. to G.)]. Cultivated at Kew as K. 405 and on 21.6.28 (styles somewhat shorter and stouter than usual).

Distrib. Cent. and S. Eur., Medit. Region.

A. campestre *L.* var. **compactum** *Turrill* var. nov. ; a var. *micropetalo* (Fisch.) Boiss. inflorescentiis (infructescentiis) compactioribus, siliculis vix maturis ovatis haud orbiculatis differt.

Plantae annuae, haud ramosae, 7–12 cm. longae. *Folia* var. *micropetali* illis similia. *Inflorescentia* compactae, post anthesin 3-4·5 cm. longae ; pedicelli 3·5 mm. longi, fastigiati haud horizontaliter patentes, floribus luteis. *Siliculae* immaturae ovatae, 3·25 mm. longae, 2·75 mm. latae ; stylus 0·75 mm. longus.

Yam, May 1927, No. 1781. Mostly fruiting at this time.

It is well-known that *Alyssum campestre* L., as usually accepted, is a polymorphic species extending over a wide geographical area. Even in the collection enumerated here the vars. *genuinum* and *micranthum* as understood by Boissier are represented in addition to the new variety *compactum*. This last is undoubtedly related to the var. *micropetalum* which was described as a species by Fischer and reduced to a var. of *campestre* by Boissier [Flor. Or. i. 284 (1867)]. Thus it has the filaments with most often 2 teeth. The number of ovules in each loculus fluctuates between 1 and 2.

A. dasycarpum *Steph.* in Willd. Sp. Pl. iii. 469 (1801).

Hills to the south of Tabriz, 9.4.26, flowers yellow, No. 1356; 4.26, No. 1381; Tabriz, weed in garden, 5.26, No. 1773; 5.27, No. 1782; hills to the south of Tabriz, 12.5.27, No. 1783.

Distrib. S.E. Russia, Asia Minor east to Afghanistan.

Nos. 1356 and 1381 are very young and probably represent merely the dwarf form typical of the hills south of Tabriz but they may be the var. *minus* Bornm. Iter Persico-turcicum 1892-93, Nos. 2174, 2175 in Herb. Kew.

A. desertorum Stapf in Denkschr. Akad. Wien li. 302 (1886).

Near Tabriz, garden weed, 1.4.26, flowers yellow, No. 1337; 9.4.26, Nos. 1353, 1354; 12.3.26, No. 1423; 10.4.27, No. 1777; 5.27, No. 1787; cultivated at Kew from Tabriz seed as K. 419 and 21.6.28. Naturally flowers from March to May.

Distrib. East-Cent. Eur., Balkan Penins., Orient, Cent. Asia.

A. lanigerum *DC.* Syst. ii. 308 (1821).

Yam, 20.7.28, No. 2447.

Distrib. N. and W. Perisa.

A. linifolium *Steph.* in Willd. Sp. Pl. iii. 467 (1801).

Hills to the south of Tabriz, 1.4.26, flowers yellow, No. 1336; garden weed, 1.4.26, No. 1338; 9.4.26, No. 1351; hills to the south of Tabriz, 9.4.26, No. 1352; near Tabriz 5.27, No. 1786.

Distrib. Medit. Region to Cent. Asia.

A. Muelleri *Boiss et Buhse* in Nouv. Mém. Soc. Nat. Mosc. xii. 16 (1860).

Red hills to the north of Tabriz, 17.5.27, rather large bright yellow flowers, No. 1788; 1.5.28, No. 2250.

Distrib. Armenia, Persia.

No. 2249, from the top of Mt. Sir, Urmia, 27.5.28, may be a variety of this species with narrower leaves and paler slightly larger flowers.

A. Szovitsianum *Fisch. et Mey.* Ind. Sem. Hort. Petrop. iv. 31 (1837).

Near Tabriz, 15.5.27, flowers yellow, No. 1780; Urmia district, Band, 25.5.28, No. 2248. Flowers in April and May.

Distrib. Asia Minor, Syria, Iraq, Transcaucasia, W. and N. Persia.

Alyssum sp. nov. aff. *A. lanigero* DC. sed planta nana pedicellis crassioribus differt.

Mishou Dagh, 19.7.28, Nos. 2368, 2437.

These two specimens probably represent a new species. Their morphological affinity is with *A. lanigerum* DC. but the habit is so different that I hesitate to make them a variety of this. Only one seed appears to be ripened in each silicule. No. 2437 has longer styles than No. 2368. In the absence of flowers in both specimens no new name is proposed.

Barbarea plantaginea *DC.* Syst. ii. 208 (1821); Near Tabriz, cultivated at Kew as 58/28, in flower and young fruit, 10. 6.30.
Distrib. Asia Minor, Armenia, Syria, Persia.

Brassica elongata *Ehrh.* Beitr. vii. 159 (1792).
Weed in garden, near Tabriz, 5.6.27, flowers yellow, No. 1813; hills south of Tabriz, 5.29, No. 2552.
Distrib. S.E. Eur., Asia Minor, Caucasus, Armenia, Iraq, N. Persia.

Camelina silvestris *Wallr.* Sched. 347 (1822) var. **albiflora** *Boiss.* Flor. Or. i. 311 (1867).
Near Tabriz, garden weed and on the hills to the south, 29.4.26, No. 1434; 5.26, No. 1526; 22.4.27, No. 1808; cultivated at Kew from Tabriz seed as K.436 and 19.6.28. Flowers from Mid-April and throughout May; fruits in May and June, and ripe seeds gathered in July. The flowers are pale yellow when they first open and then become gradually white.
Distrib. (of species) Cent. Eur. and Medit. Region.
(of var.) Cilicia, Persia.

Capsella Bursa-Pastoris *Medic.* Pflanzeng. 85 (1792).
Tabriz, garden weed, 1.4.26, Nos. 1347, 1348, 1349. The last is a very dwarf variety or form.
Distrib. Now practically cosmopolitan as a weed and ruderal.

Chorispora iberica *DC.* Syst. ii. 437 (1821).
Tabriz, garden weed, 14.3.26, flowers pale yellow, No. 1320; 27.3.26, No. 1335; 3.26, No. 1368. The first plant to flower each spring in the Tabriz district.
Distrib. Armenia, Transcaucasia, N. Persia.

C. tenella *DC.* Syst, ii. 435 (1821).
Near Tabriz, garden weed, 1.4.26, No. 1342; 11.4.26, No. 1366; 25.4.26, No. 1398; 24.4.26, No. 1404; cultivated at Kew from Tabriz seed 20.6.28. Flowers naturally in April and May, a rather deep pink.
Distrib. S. Russia, Crimea, E. Asia Minor, Caucasus, N. Persia, Turkestan, Afghanistan, Baluchistan, Cent. Asia.

Clypeola lappacea *Boiss.* in Ann. Sci. Nat. Ser. II, xvii. 174 (1842);
Near Salmas, Urmia district, 5.26, No. 1565. Also occurs on Mishou Dagh.
Distrib. Syria, Iraq, Persia, Turkish Armenia.

Cochlearia Snowitzii *Boiss.* Flor. Or. i. 248 (1867).
Mishou Dagh, rocky places, 2.9.29. No. 2630.
Distrib. Azerbaidjan.

Conringia clavata *Boiss.* in Ann. Sci. Nat. Ser. II. xvii. 84 (1842).
Hills to the south of Tabriz, 2.5.26, No. 1461. Flowers yellow.
Distrib. Asia Minor to Syria and N. Persia.

C. orientalis *Andrz.* apud DC. Syst. ii. 508 (1821).

Near Tabriz, garden weed, 11.3.26, No. 1319 ; 24.4.26, No. 1403 ; 5.5.26, No. 1473 ; cultivated at Kew from Tabriz seed, 18.6.28. Flowers normally in second half of April and in May, cream-white.
Distrib. Cent. Eur. and Medit. Region.

Crambe juncea *M. Bieb.* Flor. Taur.-Cauc. iii. 421 (1819). var. **aculeolata** *N. Busch* in Flor. Cauc. Crit. iii. 4, 229 (1908).

Near Tabriz, 5.26, flowers white, No. 1583 ; above Zindjanab, Sahand Range, 25-27,6.29, No. 2511. This plant is widely scattered on mountain sides and in cornfields, not abundant but growing as isolated plants here and there. All leaves are basal with a prickly midrib. The roots and stems are loose so that the whole plant rocks in the wind.
Distrib. (of species) Caucasus, Armenia, N. Persia.
(of var.) Russian Armenia and N. Persia.

Eruca cappadocica *Reut.* ex Boiss. Diagn. Ser. II. vi. 13 (1859).

Weed in garden near Tabriz, 5.26, flowers pale yellow and brown veined, Nos. 1483, 1621, 1707.
Distrib. Asia Minor to Armenia and Persia.

Erysimum persicum *Boiss.* in Ann. Sci. Nat. Ser. II. xvii. 79 (1842).

Near Tabriz, 5.26, flowers yellow, No. 1729 ; 6.27, Nos. 1817, 1821, 1822.
Distrib. Azerbaidjan.

E. repandum *L.* Amoen. Acad. iii. 415 (1756).

Near Tabriz, garden weed, 26.4.26, flowers yellow, No. 1420.
Distrib. Eur. and Orient.

Euclidium syriacum *R. Br.* in Ait. Hort. Kew. ed. 2 iv. 74 (1812).

Near Tabriz, garden weed, 4.26, flowers minute and white, Nos. 1375, 1426 ; 5.26, Nos. 1501, 1502, 1700. Flowers April to May, fruits May to August.
Distrib. E. Eur. to N.W. India.

E. tataricum *DC.* Syst. ii. 422 (1821).

Tabriz, garden weed, flowers white, 26.4.26, No. 1406 ; 4.26, No. 1446 ; in a garden on the hills, 29.4.26, No. 1457 ; 6.27 (in fruit), No. 1807 ; cultivated at Kew from Tabriz seed, 29.6.28, and in fruit, 3.6.29.
Distrib. N. Persia, Turkestan, Afghanistan, Cent. Asia.

Fibigia suffruticosa *Sweet* Hort. Brit. ed. 1, 467 (1827).

Near Sir, Urmia district, 6.26, flowers deep purplish-pink, Nos. 1552, 1587 ; hills south of Tabriz, 6.26, No. 1738 ; 5.6.28, No. 2246 ; hills south of Tabriz, and Sir, 6.28, No. 2335 ; Flowers in May and June, purple. The last specimens have a less dense indumentum of

smaller stellate hairs and slightly narrower fruits than the majority of our sheets.
Distrib. Armenia, Persia.

Goldbachia torulosa *DC.* Syst. ii. 577 (1821). *G. laevigata* DC. var. *ascendens* Boiss. Flor. Or. i. 243 (1867).

Tabriz, garden weed, 1.4.26, No. 1343; 11.4.26, No. 1367; 25.4.26, No. 1396; in garden among hills to south of Tabriz, 29.4.26, No. 1427; 5.26 (fruit), No. 1576; cultivated at Kew from Tabriz seed, 3.6.29. Flowers mauve, or palish blue or pale pink, April and a little in May.
Distrib. Orient and Cent. Asia.

Hesperis persica *Boiss.* in Ann. Sci. Nat. Ser. II. xvii. 64 (1842) var. **leiocarpa** *Boiss* ex Grossh. in Beih. Bot. Centrlbl. xliv. 216 (1927) siliquis glabris.

Sir, Urmia district, 21.5.26, flowers purple, No. 1519; Band, Urmia district, 25.5.28, No. 2244.
Distrib. (of species) Armenia, Kurdistan, and S. Persia.
(of var.) N. Persia, Kurdistan.

Isatis glauca *Auch.-Eloy* ex Boiss. in Ann. Sci. Nat. Ser. II. xvii. 201 (1842) et Flor. Or. i. 378 (1867).

Weed in gardens east of Tabriz, 5.27, flowers yellow, Nos. 1862, 1890.
Distrib. Asia Minor, Armenia, Persia.

I. latisiliqua *Stev.* in Mem. Soc. Nat. Mosc. iii. 267 (1812) ex Busch in Flor. cauc. crit. iii, 4. 243 (1808).
Distrib. Asia Minor, Armenia, Persia.

Urmia district, 5.26, flowers yellow, No. 1520 (leaves and stems hairy, young silicules hairy); near Tabriz, 5.26, No. 1582 (leaves and stems sparsely hairy, mature silicules glabrous); Urmia district, Band, 25.5.28 and Sir, 27.5.28, No. 2243 (stems and leaves strongly hairy, young silicules densely hairy).
Distrib. Transcaucasia, Armenia, Persia.

In spite of the published work of Busch, l.c., the intra-specific classification of *I. latisiliqua* is not in a satisfactory state. It is evidently very polymorphic, especially in indumentum, and breeding experiments will probably be necessary to clear up its taxonomy.

Lepidium Draba *L.* Sp. Pl. 645 (1753).

Waste places in garden, near Tabriz, very abundant, flowers white, 6.27, No. 1812, young shoots used as a salad under the name "Khiliwili." Flowers mid-April, May to July.
Distrib. Medit. Region.

L. latifolium *L.* Sp. Pl. 644 (1753).

Weed in gardens east of Tabriz, 10.6.27, flowers white, No. 1863.
Distrib. E.N. Temp. Region.

L. perfoliatum *L.* Sp. Pl. 643 (1753).

Near Tabriz, garden and cornfield weed, 14.4.26, No. 1377. Cultivated at Kew from Tabriz seed as K. 402, 19.5.27. Flowers yellow, mid-April to July.

Distrib. E.N. Temp. Region.

L. persicum *Boiss.* in Ann. Sci. Nat. Ser. II. xvii. 196 (1842).

Hills to the north of Tabriz, 7.28, flowers white, No. 2448.

Distrib. Persia, Armenia, Afghanistan.

L. sativum *L.* Sp. Pl. 644 (1753).

In garden, Tabriz, 5.26, flowers white, No. 1496. Called " Taratun teck." Cultivated at Kew from Tabriz seed as K. 398, 21.7.27.

Distrib. Now practically cosmopolitan as an escape from cultivation.

L. vesicarium *L.* Sp. Pl. 643 (1753).

Very common in and around Tabriz, still in flower in the valley of Livan, 9.25, flowers white, No. 1286 ; near Tabriz, 5.26, No. 1486 ; cultivated at Kew from Tabriz seed as K. 401 and 14/27, 10.7.28.

Distrib. Caucasus, Armenia, Persia.

Malcolmia africana *R. Br.* in Ait. Hort. Kew. ed. 2, iv. 121 (1812)

Near Tabriz, garden weed, 4.26, No. 1364 ; 25.4.26, No. 1397 ; 26.4.26, No. 1408 ; 4.26, in fruit, No. 1709 ; 4.27, No. 1814 ; cultivated at Kew from Tabriz seeds as K. 437 and on 18.6.28. The degree or spreading of the hairs on the siliquas varies considerably. The flowers are pink, pink with deeper blotches, or wholly of a deeper pink colour.

Distrib. E.N. Temp. Region.

M. africana *R. Br.* var. **laxa** *Boiss.* Flor. Or. i. 223 (1867).

Near Tabriz, 11.4.26, flowers pink, No. 1365 ; 26.4.26, No. 1407.

Distrib. (of var.) Turkestan, Persia.

M. africana *R. Br.* var. **stenopetala** *Boiss* Flor. Or. i. 224 (1867).

Near Tabriz, 5.26, flowers pink, No. 1498.

Distrib. (of var.) Turkestan, Persia.

M. africana *R. Br.* var. **intermedia** *Boiss.* Flor. Or. i. 223 (1867).

Near Tabriz, 6.27, No. 1815. Glabrous or subglabrous fruits and generally pinker flowers.

Distrib. (of var.) Turkestan, Caucasus, Persia.

M. torulosa *Boiss.* Flor. Or. i. 225 (1867).

Weed in cultivated ground near Tabriz, 5.26, No. 1503 (mixed with varieties of *M. africana*), 2.5.26, No. 1466 ; 6.27, No. 1816. Flowers white.

Distrib. N. Africa and Orient eastwards to Afghanistan.

Matthiola ovatifolia *Boiss.* Diagn. Ser. 1. vi. 9 (1845).

Hills north of Tabriz, 1.5.28, flowers dirty cream and sweetly scented, No. 2245.

Distrib. Persia.

Myagrum perfoliatum *L.* Sp. Pl. 640 (1753).

Weed in garden near Tabriz, 5.26, flowers white, No. 1609.

Distrib. Cent. Eur. and Medit. Region.

Rapistrum rugosum *All.* Flor. Pedem. i. 257 (1785).

Weed in garden near Tabriz, 5.26, flowers rather pale pink, No. 1571; 5.26, No. 1690; cultivated at Kew from Tabriz seed as K. 434 and 10.7.28.

Distrib. Cent. and S. Eur. and east to Caucasus and Persia.

Sameraria armena *Desv.* Journ. Bot. iii. 161 (1813).

Isatis armena L. Sp. Pl. 670 (1753).

Hills south of Tabriz, 5.6.27, flowers bright yellow, No. 1823.

Distrib. Armenia, Persia, Turkestan.

Sinapis arvensis *L.* Sp. Pl. 668 (1753).

Near Tabriz, 5.26, No. 1573 (a small plant, with narrow leaves and young fruits slightly retrorse-hispid); 5.26, Nos. 1622, 1623; 5.26, No. 1708.

Distrib. Now nearly cosmopolitan as a weed of cultivation.

A specimen from near Yam, 7.8.27, No. 2028, is probably this species, with the flowers abnormal. The floral parts are replaced by more or less bract-like structures.

Sisymbrium altissimum *L.* Sp. Pl. 659 (1753).

Near Tabriz, ruderal and garden weed, 11.4.26, flowers pale yellow, No. 1363; 26.4.26, No. 1421; 5.26, Nos. 1516, 1727; cultivated at Kew from Tabriz seed as K. 421.

Distrib. E.N. Temp. Region.

Sisymbrium Loeselii *L.* Cent. pl. i. 18. n. 49 (1755).

Near Tabriz, garden weed, 11.25, flowers a deeper yellow than those of *S. altissimum*, No. 1318; 5.5.26, No. 1474; 5.26, Nos. 1705, 1706; 6.27, No. 1810; cultivated at Kew from Tabriz seed as K. 422 and K. 423.

Distrib. Cent. and S. Eur., Orient, N. Asia, N. India.

The specimens show very varying degrees of hairiness of the leaves and stems. Some of the specimens quoted are quite glabrous and others have long distinct hairs on the stems or leaves or both. The exact value of this character is at present doubtful since plants differing in this respect have been obtained from the same packets of wild seed. Several " forms " are named by O. E. Schulz in Engler's Pflanzenr. iv. 105. 97 (1924).

S. nudum *Boiss.* Flor. Or. i. 214 (1867).

Hills to the south of Tabriz, 16.4.26, flowers yellow No. 1379; garden weed, 29.4.26. No. 1431.

Distrib. Syria, Armenia, east to Cent. Asia and N. India.

S. pumilum *Steph.* ex. Willd. Sp. Pl. iii. 507 (1801). *Arabidopsis pumila* Busch, vide Engler's Pflanzenr. iv. 105. 277 (1924).

Near Tabriz, garden weed, 4.26, No. 1376; 26.4.26, No. 1412; 10.4.27, No. 1811. Flowers yellow, April and May.

Distrib. Cilicia, Syria, Iraq, Arabia, Caucasus, Persia, Turkestan, Afghanistan, Baluchistan, Cent. Asia, W. Himalayas.

S. Sophia *L.* Sp. Pl. 659 (1753).

Tabriz, garden weed, 20.3.26, flowers yellow, No. 1323; 1.4.26, No. 1344. Used as a medicinal herb. Persian "Khäk-shir." Turki "Shuvaran."

Distrib. E.N. Temp. Region.

Sterigmostemum tomentosum *M. Bieb.* Flor. Taur.-Cauc. iii. 444 (1819); N. Busch in Flor. Cauc. Crit. iii. 684 (1910); var. **subintegrum** *Turrill* var. (vel forma) nov. caulibus altioribus ramosioribus foliis inferioribus plus minusve pinnatifidis superioribus integris a planta biebersteiniana recedit.

Near Tabriz, 20.5.27, flowers yellow, Nos. 1818, 1819, 1820.

Distrib (of species) around the Caspian Sea, Armenia, Songaria, Turcomania, and N. Persia.

Aucher-Eloy 4108, from "Azerbidjan," without date or exact locality is to be included under the variety here described.

Thlaspi arvense *L.* Sp. Pl. 646 (1753).

Near Tabriz, 5.26, No. 1500; cultivated at Kew from Tabriz seed as K. 408, 19.5.27.

Distrib. N. Temp. Region.

Vogelia apiculata *Vierh.* Oesterr. Bot. Zeitschr. lxx. 168 (1921).

Weed in garden near Tabriz, flowers yellow, 5.26, No. 1514; cultivated at Kew as K. 407, 21.7.27. Flowers April and May.

Distrib. Medit. Region from Spain to N. India.

Capparidaceae.

Capparis sicula *Duh.* Traité des Arbres ed. 2. i. 159 (1801).

Sir, west of Lake Urmia, 5.26, No. 1524. Also at Marand and Yam. Flowers end of May to August. The plant is common in cemeteries and mountainous rocky places. The fruit is eaten and is known locally as "mountain melon."

Distrib. S. Eur. east to Persia.

Cleome ornithopodioides *L.* Sp. Pl. 672 (1753) var. **stipitata** *Boiss.* Flor. Or. i. 411 (1867).

Near Tabriz, 6.27, No. 1809; valley of Livan, 9.27, No. 1292. Flowers normally in June and July, flowers white or pinkish and whole plant very glandular and strongly scented.

Distrib. (of species and var.) Asia Minor east to Afghanistan.

RESEDACEAE.

Reseda lutea *L.* Sp. Pl. 449 (1753).

Weed in garden, near Tabriz, 6.5.26, No. 1547. A very common weed and ruderal in flower from May to the end of the season.

Distrib. Cent. Eur. and Medit. Region.

VIOLACEAE.

Viola occulta *Lehm.* Ind. Sem. Hamb. 1829 sec. Boiss. Flor. Or. i. 467 (1867).

South of Tabriz, garden weed, 29.4.26. No. 1436.

Distrib. Asia Minor to Persia and Cent. Asia.

POLYGALACEAE.

Polygala anatolica *Boiss. et Heldr.* in Boiss. Diagn. Ser. II. i. 57 (1853) ?

Yam. 22.5.27, flowers pink, No. 2065.

Distrib. Asia Minor, Syria, Caucasus, Armenia.

The material is poor and young and the identification is uncertain.

P. Hohenackeriana *Fisch. et Mey.* Ind. Sem. Hort. Petrop. iv. 42 (1838).

Near Tabriz, 15.5.27, flowers predominantly white, creamy, or often pinkish, No. 1800.

Distrib. Caucasus, Armenia, N. Persia.

FRANKENIACEAE.

Frankenia hirsuta *L.* Sp. Pl. 331 (1753) var. **erecta** *Boiss.* Flor. Or. i. 780 (1867).

Roadside in Shor Dara (Dere), between Yam and Tabriz, flowers a beautiful pink, 28.7.28, No. 2364.

Distrib. (of species) E.N. Temp. Region.
(of var.) N. Persia, Armenia.

CARYOPHYLLACEAE.

Acanthophyllum mucronatum *C. A. Mey.* Verz. Pfl. Cauc. 210 (1831).

Dik Dash, Yam, 28.8.27, flowers white, No. 2092.

Distrib. Caucasus, Armenia, N. Persia, Transcaspia.

A. squarrosum *Boiss.* Diagn. Ser. II. i. 81 (1853).

Hills south of Tabriz, 7.26, flowers white or pink, No. 1686; 7.6.27, No. 2019. Flowers in June and July.

Distrib. Persia, Afghanistan, Baluchistan.

Allochrusa persica *Boiss.* Flor. Or. i. 560 (1867).

Hills south of Tabriz, 6.26, No. 1743; 7.6.27, No. 2016. Has an apparently short flowering period in June, flowers white, creamy, or pink, very showy and delicate and never still in the slightest breeze.

Distrib. Azerbaidjan.

Arenaria gypsophiloides *L.* Mant. i. 71 (1767) " f." **glaberrima** *Bornm.* in Bull. Herb. Boiss. Ser. 2, V. 125 (1905).

Mishou Dagh, 19.7.28, flowers white, No. 2373 ; above Zindjanab Sahand Range, 25-27.6.29, No. 2515.

Distrib. (of species) Armenia, N. Persia.

A. serpyllifolia *L.* Sp. Pl. 423 (1753) sensu lato. Near Tabriz, 8.5.27, flowers white, No. 1856 ; cultivated at Kew from Tabriz seeds, 29.6.28 and 14.8.28.

Distrib. E.N. Temp. Region.

In some respects the specimens approach the var. *leptoclados* Reichb. (*A. leptoclados* Guss.), but the pedicels and sepals are longer.

A. Szowitsii *Boiss.* Flor. Or. i. 695 (1867).

Sir, Urmia district, 20.5.26, flowers white, No. 1533 ; near Tabriz, 22.5.27, No. 1849a. Also found on the Mishou Dagh.

Distrib. Azerbaidjan.

Buffonia macrocarpa *Ser.* in DC. Prodr. i. 388 (1824) var. **elata** *Boiss.* Flor. Or. i. 667 (1867) subvar. **velutina** *Bornm.* Verhl. Zool.-Bot. Ges. Wien lx. 85 (1910).

Mishou Dagh, 12.7.28, flowers white, No. 2385.

Distrib. (of species) Persia, Afghanistan.
(of var. and subvar.) Persia.

Cerastium dichotomum *L.* Sp. Pl. 438 (1753).

Near Tabriz, 5.26, flowers white, No. 1490 ; 5.26, No. 1626 ; cultivated at Kew from Tabriz seeds as K. 417 and 18.6.28.

Distrib. Medit. Region.

C. vulgatum *L.* Flor. Suecc. ed. 2, 158 (1755).

Yam, 21.8.27, flowers white, No. 2083 ; under Mishou Dagh, 10.9.28, No. 2468. Plants not quite typical, especially in leaf shape.

Distrib. E.N. Temp. Region.

Dianthus crinitus *Smith* in Trans. Linn. Soc. ii. 300 (1794).

Dik Dash, Yam, 2.8.28, flowers pink or white, No. 2363 ; near Tabriz, 2.8.29, No. 2649.

Distrib. Asia Minor, Cyprus, Armenia, Transcaucasus, Persia, Turkestan, Baluchistan.

D. crossopetalus *Fenzl.* ex Boiss. Flor. Or. i. 496 (1867). *D. crinitus* Smith var. *crossopetalus* Boiss. l.c.

Hills to the south of Tabriz, 6.7.26, flowers white, No. 1677 ; 6.26, No. 1693 ; 7.6.27, No. 1843.

Distrib. N. and W. Persia.

D. Libanotis *Labill.* Dec. i. 14, t. 5 (1791).

Hills south of Tabriz, 6.26, flowers pink veined, No. 1762 ; hills south of Tabriz, 6.7.27, No. 2017 ; cultivated at Kew from Tabriz seed, 13.10.28. Flowers normally from the end of June to August.

Distrib. Syria, Sinai, Iraq, Armenia, N. and W. Persia.

D. orientalis *Sims* in Bot. Mag. t. 1069 (1808) var. **obtusisquameus** (*Boiss.*) Flor. Or. i. 495 (1867),

Mishou Dagh, 12.7.28 and 19.7.28, flowers a beautiful pink, No. 2384 ; above Zindjanab, Sahand Range, 25-27.6.29, No. 2524 ; Mishou Dagh, 5.8.29, No. 2598.

Distrib. (of species) Persia, Afghanistan.
(of var.) Caucasus and Persia east to N. India.

D. tabrisianus *Bienert* in Bunge pl. Pers. exs. 1859 ex Boiss. Fl. Or. i. 496 (1867).

Near Tabriz, 6.26, flowers white or pink, No. 1694, 10.6.27, No. 1842 ; Mishou Dagh, 5.8.29, No. 2583.

Distrib. N. Persia, Afghanistan.

Gypsophila paniculata *L.* Sp. Pl. 407 (1753).

Near Tabriz, 6.26, flowers white, No. 1721 ; 10.6.27, No. 1841. Flowers from June onwards.

Distrib. Cent. Eur., Caucasus, N. Persia, Cent. Asia.

G. porrigens *Boiss.* Flor. Or. i. 557 (1867).

Near Tabriz, 5.26, flowers white or pinkish, No. 1615 ; 6.7.26, No. 1651 ; in fruit, 27.7.26, No. 1766 ; garden weed, 1.6.27, No. 2018 ; cultivated at Kew from Tabriz seed as K. 412 and 14.8.28. Flowers normally in June and July and fruits in July and August.

Distrib. Asia Minor, Syria, Palestine, Iraq, Armenia, Persia, Afghanistan.

G. ruscifolia *Boiss.* Diagn. Ser. I. 1.12 (1842).

Yam pass, below Dik Dash, 8.27, flowers white, No. 2015. Flowers from mid-June to August.

Distrib. Syria, Iraq, Armenia, Persia.

Holosteum glutinosum *Fisch. et Mey.* Ind. Sem. Hort. Petrop. vi. 52 (1839).

Near Tabriz, garden weed, 1.4.26, flowers white or pink, No. 1346, a rather large form ; hills to the south, 4.26, No. 1374, dwarf plants ; near Tabriz, 4.26, No. 1380 ; plants branched from base ; garden in hills south of Tabriz, 29.4.26, No. 1433 ; garden weed, 4.27, No. 1778, partly pink flowered plants, hills south of Tabriz, 24.4.27, No. 1857, dwarf plants ; hills south of Tabriz, 5.27, No. 1858, a much branched plant ; cultivated at Kew from Tabriz seed, 19.6.28 and 3.6.29.

Distrib. E. Medit. Region.

The plants of this genus show a wide range of characters in various combinations and the species are difficult to characterize. Of the published descriptions the Tabriz plants agree best with that quoted above, but I have seen no type specimen of *H. glutinosum*. Gay in Ann. Sci. Nat. Ser. 3. iv. 23 (1845) has a monograph of the genus. According to this *H. glutinosum* is a variety of *H. umbellatum* and the petals are " utrinque supra basim ciliolata.' The petals of the Tabriz specimens are, however, so far as I have dissected them, quite glabrous.

Exactly what *H. liniflorum* Stev. may be I am not sure. The name was published in Ind. Sem. Hort. Petrop. iii. 39 (1837) and reduced by Gay (l.c.) to *H. umbellatum* β *glutinosum*, i.e. *H. glutinosum* Fisch. et Mey. The stamen number and the petal shape do not agree with those of the Tabriz plants. In Ind. Sem. Hort. Petrop. vi. 52 (1839) a different description is attached to the name *H. liniflorum* Stev. which is here used for a species with long petals.

Lepyrodiclis holosteoides *Fenzl.* in Ledeb. Flor. Ross. i. 359 (1842).

Near Tabriz, 11.5.26, flowers invariably white, No. 1511; Zindjanab, end of June 1929, No. 2637; cultivated at Kew from Tabriz seeds as K. 399, 21.7.27, and 18.6.28.

Distrib. E. Asia Minor, Armenia, N. Persia, Turkestan, Baluchistan, N. India, Cent. Asia.

Melandryum eriocalycinum *Boiss.* Diagn. Ser. II. i. 78 (1853).

Tabriz, garden weed, flowers white, 30.4.26, Nos. 1438 (♀), 1439 (♂); 19.4.27, No. 1852 (♂), 1853 (♀), 1854 (♂); cultivated at Kew from Tabriz seed as K. 453, 20.5.28.

Distrib. Asia Minor to Afghanistan.

The degree of development of the calyx indumentum varies very greatly and with the data available at present it appears to be inadvisable to attempt a division of the species. It is probable that many botanists would refer our specimens, wholly or in part, to the var. *persicum* Boiss.

Minuartia acuminata *Turrill* in Kew. Bull. 1929, 225.

Mishou Dagh, 19.7.28, flowers white, No. 2374.

Endemic.

Saponaria orientalis *L.* Sp. Pl. 409 (1753).

Valley of Livan, on rocky stones near torrent, mostly fruiting, 9.25, flowers white or pink, No. 1301; near Tabriz, 5.6.27, No. 1850; ploughed field near Yam, 28.8.27, No. 2091.

Distrib. Greece, Asia Minor, Armenia, N. Persia,

The specimens are not quite typical of the species and vary even amongst themselves. No. 1301 is very floriferous and glandular hairy and has capsules equal in length to the calyx. No. 850 is younger but its older calyces are glabrescent. No. 2091 is a luxuriant, much branched, very floriferous, densely glandular hairy plant, with the pedicels rather short and the capsules exceeding the calyces in length.

Silene Aucheriana *Boiss.* Diagn. Ser. I. i. 27 (1842).

Above Zindjanab, Sahand Range, 25-27.6.29, flowers pinkish, No. 2521.

Distrib. Armenia, Kurdistan, N. Persia, Baluchistan.

There is a wide range of variation within this species. The specimens under No. 2521 combine the narrow-leaved character of the " f " *stenophylla* Bornm. with the character of having a glandular

calyx such as is found in var. *viscosa* Freyn et Sint. The polymorphism of the species is indicated by Bornmüller in Beih. Bot. Centrlbl. xix. ii. 216 (1906).

S. commelinaefolia *Boiss.* Diagn. Ser. I. i. 35 (1842).
Mishou Dagh, 12.7.28, No. 2386.
Distrib. Armenia, N. Persia.

S. conoidea *L.* Sp. Pl. 418 (1753).
Near Tabriz, 29.4.26, flowers pink or red, also white flowered forms occur, No. 1447; hills south of Tabriz, 2.5.26, No. 1459; near Tabriz, 5.26, No. 1625; cultivated at Kew from Tabriz seeds as K. 397, and 16.8.28.
Distrib. Medit. Region.

S. delectabilis *Turrill* in Kew. Bull. 1929, 225.
Near the top of Mishou Dagh, in cracks in the rocks, with very showy deep pink-purple flowers, 19.7.28, No. 2359.
Endemic.

S. Marschallii *C. A. Mey.* Verz. Pfl. Cauc. 214 (1831).
Above Zindjanab, Sahand Range, 25-27.6.29, flowers white verging on pink, No. 2505.
Distrib. Asia Minor, Armenia, Caucasus, N. Persia.

S. noctiflora *L.* Sp. Pl. 419 (1753).
Garden weed, Tabriz, flowers white, 23.5.27, No. 1855; Urmia plain, 28.5.28, No. 2323.
Distrib. E.N. Temp. Region.

S. peduncularis *Boiss.* Diagn. Ser. I. i. 30 (1842).
Hills south of Tabriz, flowers white, 27.6.27. No. 2021.
Distrib. Transcaucasus and Persia.

S. pruinosa *Boiss.* Diagn. Ser. I. i. 23 (1842) et viii. 85 (1849).
Hills to the south of Tabriz, 5-6.26, flowers white, No. 1630; 21.5.27, Nos. 1845, 1846, 1847, 1848, 1849; 22.6.27, No. 2020 (?)
Distrib. Asia Minor, Syria.

S. pruinosa *Boiss.* var. **rubra** *Gilliat-Smith* a planta vulgare petalis rubris differt.
Hills south of Tabriz, 5.6.28, No. 2320.

S. leyseroides *Boiss.* Diagn. Ser. I. i. 41 (1842). *S. arenosa* C. Koch in Linnaea xv. 711 (1851).
Hills south of Tabriz, 5.6.28, No. 2321.
Distrib. Iraq, Armenia, Persia, Afghanistan.

S. pungens *Boiss.* Diagn. Ser. I. i. 32 (1842).
Mishou Dagh, 5.8.29, No. 2590.
Distrib. Armenia, N. Persia.

S. racemosa *Otth.* in DC. Prodr. i. 384 (1824) var. **Sibthorpiana** *Boiss.* Flor. Or. i. 589 (1867).

Near Tabriz, 16.5.26, flowers white, No. 1495 ; cultivated at Kew from Tabriz seeds, 14.8.28 and 13.10.28. Flowers from the second half of May till August.
Distrib. (of species sensu Boiss.) Southern and eastern parts of the Balkan Peninsula, Asia Minor, Cyprus, Syria, Iraq, N. Persia, Caucasus.
(of var.) from species area except Caucasus.

S. spergulifolia *M. Bieb.* Flor. Taur.-Cauc. iii. 305 (1819).
Yam, 24.6.28, No. 2347.
Distrib. E. Asia Minor, Syria, Armenia, Transcaucasus, Persia.
The varieties of this species as accepted by Boissier do not seem to be very well differentiated.

S. swertifolia *Boiss.* Diagn. Ser. I. i. 32 (1842).
Valley of Livan, rocky hillsides, 9.25, flowers white, No. 1280 ; near Tabriz, 6.26, Nos. 1715, 1761 ; near Tabriz, 5.6.27, No. 1844.
Distrib. Asia Minor, Syria, Persia.

S. viscosa *Pers.* Syn. i. 497 (1805).
Above Zindjanab, Sahand Range, 25-27.6.29, flowers white, No. 2510.
Distrib. Cent. Eur., S. Russia, Asia Minor, Armenia, N. Persia, Cent. Asia.

S. vulgaris *Garcke* Flor. Deutschl. ed. ix. 64 (1869).
Mishou Dagh, wet ravine, end of August, 1929, flowers white, No. 2606.
Distrib. E.N. Temp. Region.

Vaccaria pyramidata *Med.* Phil. bot. i. 96 (1789) var. **grandiflora** *Hayek* Prodr. Flor. Penins. Balc. i. 218 (1924).
Near Tabriz, 6.26, flowers pink or red, No. 1647 ; Yam, 8.27, No. 2029 ; cultivated at Kew from Tabriz seed as K. 396, 29.6.28 and 23.7.28.
Distrib. (of species and var.) E. N. Temp. Region.

TAMARICACEAE.

Myricaria germanica *Desv.* in Ann. Sci. Nat. Ser. I. iv. 349 (1825).
Mishou Dagh, along water in a field, 22.5.27, flowers white or pink, No. 1930.
Distrib. Cent. Eur. and Medit. Region to Cent. Asia.

Reaumuria hypericoides *Willd.* Sp. Pl. ii. 1250 (1800).
Hills to the north of Tabriz, 22.6.27, flowers white or pink, often with cream tinge, Nos. 1926, 1927 ; 7.27, No. 2148. Flowers end of June to end of August.
Distrib. Caucasus, Persia, Caspian district.

R. persica *Boiss.* Flor. Or. i. 761 (1867).
Hills to the north of Tabriz, 22.6.27, flowers white or pink, Nos. 1928, 1929 ; 7.27, No. 2149. Flowers end of June to end of August.
Distrib. Persia, " Armenia."

HYPERICACEAE.

Hypericum asperulum *Jaub. et Spach* Illustr. i. 60 (1842-43).
Urmia district, 5.26, flowers yellow, No. 1560.
Distrib. Iraq, Persia.

H. hyssopifolium *Vill.* Hist. Pl. Dauph. iii. 505, t. 44 (1789).
Yam, 8.27, No. 1968; near Tabriz, 8.27, flowers yellow, No. 2120.
Distrib. Medit. Region and Cent. Asia.

H. scabrum *L.* Cent. i. 25 (1755); Amoen. Acad. iv. 287 (1759).
Yam, 8.27, flowers yellow, No. 1969; Mt. Sir, 27.5.28, No. 2336.
Distrib. Asia Minor to Persia and Cent. Asia.

MALVACEAE.

Abutilon Avicennae *Gaertn.* Fruct. ii. 251, t. 135 (1791).
Tabriz, in garden, 8.27, flowers orange, No. 2153.
Distrib. N. Temp. Region.

Althaea (Alcea) ficifolia *Cav.* Diss. ii. 92, t. 28, f. 2 (1786) var. **glabrata** *Boiss.* Flor. Or. i. 834 (1867).
Yam, 8.27, flowers pale yellow or cream, No. 2118; near Tabriz, 21.8.27, No. 2119; 9.27, No. 1303.
Distrib. (of species) S. Russia, Armenia, Caucasus, N. Persia.
(of var.) N. Persia.

Gossypium herbaceum *L.* Sp. Pl. 693 (1753) s.l.
Garden, south-east of Tabriz, 8.28, No. 2467.
The common cultivated cotton of the district.
Distrib. Cultivated in many of the warmer parts of the world.

Hibiscus trionum *L.* Sp. Pl. 697 (1753).
Near Tabriz, 7.8.27, flowers white or pink, No. 2013; 8.27, No. 2080.
Distrib. Cent. Eur. and Medit. Region.

Malva rotundifolia *L.* Sp. Pl. 688 (1753).
Near Tabriz, garden weed, 4.5.27, flowers white or mauve, No. 2076; 5.27, No. 2123.
Distrib. E.N. Temp. Region.

M. silvestris *L.* Sp. Pl. 689 (1753) var. **mauritiana** *Boiss.* Flor. Or. i. 819 (1867).
Near Tabriz, 9.25, No. 1309. Flowers from the second half of May throughout the season, deep pink.
Distrib. (of species) E.N. Temp. Region.
(of var.) locally in the area of the species.

LINACEAE.

Linum austriacum *L.* Sp. Pl. 278 (1753).
Near Tabriz, 5.26, flowers sky blue, No. 1723; Yam, 22.5.27, No. 2063.
Distrib. Cent. and S. Eur. east to Caucasus and N. Persia.

L. mucronatum *Bertol.* Misc. bot. I, 18 (1842) var. **eglandulosum** *Turrill* in Kew Bull. 1929, 226.

Near Tabriz, 5.26, flowers yellow, No. 1586.

Distrib. (of species) E. Asia Minor, Armenia, Iraq, Palestine, Syria. (of var.) Endemic.

L. usitatissimum *L.* Sp. Pl. 277 (1753).

In garden near Tabriz, 4.7.26, flowers blue, No. 1765.

Distrib. Often occurring as an escape from cultivation.

GERANIACEAE.

Biebersteinia multifida *DC.* Prodr. i. 708 (1824).

Hills to the north-east of Tabriz, 15.5.27, flowers yellow, No. 1932.

Flowers in March, fruits in May.

Distrib. Syria, Persia, Iraq, Turkestan, Afghanistan, Cent. Asia.

Erodium ciconium *Ait.* Hort. Kew. ed. 1, ii. 415 (1789).

Weed in garden near Tabriz, 5.26, flowers white or mauve to pinkish, No. 1488. Flowers in May, fruits in June and July.

Distrib. Medit. Region.

E. cicutarium *L'Hér.* ex Ait. Hort. Kew. ed. 1, ii. 414 (1789).

Near Tabriz, garden weed, 26.4.26, flowers pink, No. 1417; 24.4.27, No. 1829. Flowers April to June.

Distrib. Now nearly cosmopolitan.

E. oxyrrhynchum *M. Bieb.* Flor. Taur.-Cauc. ii. 133 (1808).

Hills south of Tabriz, 4.6.27, No. 1831. Flowers in May, pale pink, fruits in June.

Distrib. Armenia, Transcaucasus, N. Persia, Transcaspia, Songaria.

Geranium collinum *Steph.* ex. Willd. Spec. Pl. iii. 705 (1800) var. **eglandulosum** *Ledeb.* Flor. Ross. i. 468 (1842).

Yam, 7.8.27, flowers pink, No. 2004; Yam, 6-8.28, No. 2409.

Distrib. (of species and var.) S.E. Russia to Baikal and N.W. Himalayas.

G. tuberosum *L.* Sp. Pl. 680 (1753).

Hills south of Tabriz, 29.4.26, flowers pink, No. 1441.

Distrib. Medit. Region and Cent. Asia.

G. tuberosum *L.* var. **linearifolium** *Boiss.* Flor. Or. i. 873 (1867).

Yam, 22.5.27, flowers pink, No. 1830.

Distrib. (of var.) S.E. Russia, Caucasus, N. and W. Persia, Cent. Asia.

XXXV.—CONTRIBUTIONS TO THE FLORA OF SIAM.*

ADDITAMENTUM XXVIII.

Melastoma acutisepalum *Geddes* [Melastomaceae-Osbeckieae] ; a *M. polyantho* Blume cymis longioribus, receptaculo sparse adpresse setuloso, calycis segmentis multo longioribus recedit.

Frutex circa 2·5 m. altus (ex *Kerr*), ramis primo quadrangularibus adpresse hirsutis ad nodos setosis mox teretibus glabris. *Folia* oblongo-lanceolata, apice acuta, basi late cuneata, 4·4–8·2 cm. longa, 1·9–3·2 cm. lata, supra adpresse hirsuta, subtus pallidiora, ad nervos nervulosque pilis adpressis dense instructa, nervis 7 (duobus exterioribus tenuibus) pagina superiore impressis inferiore prominentibus, nervis transversis inter se parallelis supra subconspicuis subtus prominentibus, petiolo 8–11 mm. longo adpresse hirsuto supra canaliculato suffulta. *Panicula* laxa ; axes quadrangulares, hirsuti ; pedicelli 7–10 mm. longi. *Receptaculum* sparse adpresse setulosum. *Calycis* segmenta 5, lineari-lanceolata, apice acuta, 8 mm. longa, margine ciliata. *Petala* 5, purpurea (ex *Kerr*), obovata, apice obtusa, 2·5 cm. longa, 1·5 cm. lata, dorso fere glabra. *Stamina* 5 longiora, 5 breviora, longiorum connectivis ad 12 mm. infra loculos extensis basi bifurcatis, filamentis 10 mm. longis, antheris 7 mm. longis, breviorum connectivis apud antheras bifurcatis, filamentis 9 mm. longis, antheris 5 mm. longis. *Stylus* 2·8 cm. longus, glaber. *Fructus* ellipsoideus.

Kaw Chang, Klawng Kloi, 50 m., rocky ground, *Kerr* 9244.

Oxyspora caudata *Geddes* [Melastomaceae-Oxysporeae] ; ab affini *O. hirta* Ridl. ramis petiolisque pilis brevioribus instructis, foliis latioribus caudatis, calycis segmentis deltoideis recedit.

Frutex ad 5 m. altus (ex *Kerr*) ; ramuli fistulosi, primo quadrangulares, dense breviter hirsuti, mox glabrescentes, pallide corticati. *Folia* opposita inter se subaequalia, subelliptica, ovato-oblonga, vel elliptico-rotundata, caudato-acuminata, basi late cuneata vel rotundata, cordatula, 11–16 cm. longa, 5·7–8·7 cm. lata, chartacea, sicco supra viridia vel fuscescentia, subtus viridia, supra sparse setulosa, mox plus minusve glabrescentia, subtus ad nervos hirsuto-tomentosa, ad nervulos longius setosa, 7–9-nervia, nervis supra conspicuis subtus prominentibus duobus exterioribus tenuibus, nervis transversis pagina utraque plus minusve conspicuis, margine ciliata, inferne integra, superne denticulata ; petioli foliorum oppositorum inaequales, 3–10 cm. longi, hirsuto-tomentosi. *Panicula* terminalis, pedunculo communi 3–4·5 cm. longo incluso 9–15 cm. longa, basi ad 7·5 cm. diametro, pedunculo cum rhachi et ramulis densius breviter hirsuto ; pedicelli ad 5 mm. longi, puberuli ; bracteae lineares, circa 3 mm. longae, fugaces ; alabastra subacuta, apice breviter pauci-setulosa. *Receptaculum* supra ovarium productum, circa 6 mm. longum, setulosum vel hirsutum. *Calycis* segmenta 4, deltoidea, apice seta longiuscula acuminata, dorso

* Continued from *K.B.*, 1930, p. 174.

setulosa. *Petala* 4, oblonga, acuminata, circa 7·5 mm. longa et 4·5 mm. lata. *Stamina* 8, filamentis 6–7 mm. longis, antheris inter se inaequalibus, loculis basi inter se liberis, 4 longioribus 11 mm. longis, 4 brevioribus 4 mm. longis. *Stylus* 15 mm. longus, glaber. *Fructus* stramineus, glaber vel parce setulosus, ad 12 mm. longus et 6 mm. diametro.

Nakawn Sritamarat, Kao Luang, 1300–1600 m., common in evergreen forest, flowers mauve, *Kerr* 15500.

Oxyspora gracilis *Craib* [Melastomaceae-Oxysporeae]; ab *O. collina* Ridl., cui habitu similis, ramulis gracilioribus, foliis minoribus, inter alia recedit.

Frutex ad 2 m. altus (ex *Kerr*); ramuli graciles, primo setulis brevibus subadpressis instructi, mox glabri, cortice cinereo-brunneo obtecti, nodis incrassati, glabri, lenticellis haud conspicuis. *Folia* opposita, paribus inter se inaequalibus, oblongo-lanceolata vel ovato-lanceolata, apice longius obtuse acuminata, basi cuneata vel late cuneata, 5–12 cm. longa, 1·5–4·5 cm. lata, chartacea, sicco supra fusco-viridia, subtus pallide viridia, supra primo pulverulento-puberula, glabrescentia, subtus similiter iuventute puberula praetereaque ad nervos setis brevibus subsquamiformibus hic et illic instructa, e basi trinervia, nervis lateralibus utrinque 1 paulo supra laminae basem ortis, nervis supra conspicuis subtus subprominentibus, nervis transversis rectis fere patulis inter se parallelis in foliis maioribus inter se 3–4 mm. distantibus saepissime supra conspicuis subtus prominulis, margine subintegra, petiolis oppositis inter se inaequilongis 1–4 cm. longis indumento ei ramulorum simili tectis. *Inflorescentia* terminalis, pedunculo communi 4–5 cm. longo sulcato scabrido suffulta, ex umbellis tribus constituta, umbellis duabus inferioribus oppositis subsessilibus vel pedunculo ad 1 cm. longo suffultis ad 4-floris rarius 1–2-floris, umbella terminali a lateralibus circa 2 cm. distante ad 6-flora; pedicelli usque ad 1 cm. longi, scabridi, sicco saepe punicei, basi bracteis parvis deciduis instructi; flores punicei (ex *Kerr*). *Receptaculum* circa 3 mm. longum, scabridulum. *Calycis* tubus fere 2 mm. longus, truncatus, ad lobos incrassatus. *Petala* 4, elliptica, breviter subacuminata, 6 mm. longa, 3·5 mm. lata, glabra. *Stamina* 8, inter se inaequalia; maxima filamentis 9 mm. longis, antheris apice attenuatis filamentis aequilongis; parvissima filamentis 5 mm. longis, antheris circa 3·5 mm. longis; antherae omnes antice nudae, postice connectivo in appendicem brevem obtusam producto. *Stylus* staminibus intermediis subaequilongus.

Kao Nawng, 1000–1200 m., common in evergreen forest, *Kerr* 13261.

Oxyspora setosa *Craib* [Melastomaceae-Oxysporeae]; *O. hirtae* Ridl. habitu similis sed foliis ovato-ellipticis vel subellipticis supra haud glabris, nervis transversis magis numerosis et magis approximatis recedens.

Frutex circa 2 m. altus (ex *Kerr*) ; ramuli densius brunneo-tomentosi, primo parum compressi, mox teretes. *Folia* opposita, paribus inter se subaequalibus vel saepius conspicue inaequalibus, ovato-elliptica vel subelliptica, apice acute acuminata, basi rotundata, leviter cordata, 5·5–14·5 cm. longa, 3–8·5 cm. lata, chartacea, sicco supra fuscescentia, subtus pallide viridia, supra ad nervos tres medianos dense hirsuta, aliter distanter setosa, subtus ad nervos sparsius hirsuta, ad nervos transversos breviter hirsuta, aliter pilis brevibus rigidis hic et illic instructa, e basi 7-nervia, nervis duobus exterioribus tenuioribus, aliis supra conspicuis subtus prominentibus, nervis transversis sat numerosis inter se parallelis et 2–5 mm. distantibus supra plus minusve conspicuis subtus prominulis, nervulis subtus conspicuis, margine subintegra, primo longius ciliata, petiolo 1·5–5 cm. rarius usque ad 7 cm. longo densius tomentoso pilis saepe purpurascentibus suffulta. *Umbellae* et axillares et terminales, circa 20-florae, pedunculo communi saepissime 5 cm. longo pilis et glanduloso-capitatis et rigidioribus eglandulosis tecto suffultae ; pedicelli usque ad 1·5 cm. longi, pilis glanduloso-capitatis divaricatis et paucis rigidioribus eglandulosis tecti, basi bracteis parvis deciduis instructi. *Receptaculum* circa 3 mm. longum, indumento ei pedicelli simili tectum. *Calycis* segmenta 4, late deltoidea, circa 1 mm. longa et 2·5 mm. lata, apice dorso medio crasse carinata vel subcornuta. *Petala* 4, suboblonga, apice breviter acute acuminata, 7 mm. longa, 4 mm. lata, glabra. *Stamina* 8, inter se inaequalia, maxima filamentis 1 cm. longis, antheris quam filamentis paulo brevioribus, parvissima filamentis antheris subaequalibus circa 5 mm. longis, antheris omnibus dorso basi connectivo producto breviter cornutis. *Stylus* staminibus maximis subaequilongus.

Trang, Kao Sung, 900 m., evergreen forest, *Kerr* 15236.

Allomorphia procursa *Craib* [Melastomaceae-Oxysporeae] ; ab *A. alata* King receptaculo apice longius tubuloso-producto, fructu (vix maturo) subellipsoideo haud globoso, ab *A. eupteroton* Guillaumin fructu maiore longius pedicellato differt.

Frutex circa 50 cm. altus (ex *Kerr*) ; ramuli quadrangulares, angulis alatis, ad 5 mm. diametro, glabri, sicco brunnei. *Folia* subelliptica, apice subacuminata, circa 18 cm. longa et 8·5 cm. lata, chartacea, sicco supra fusco-brunnea, subtus viridi-brunnea, supra praesertim ad nervos plus minusve pulverulenta, subtus matura fere glabra, 5-nervia, nervis supra impressis subtus prominentibus, nervis transversis inter se parallelis et 4–6 mm. distantibus supra conspicuis subtus prominulis, margine obsolete denticulata, petiolo 3·5–4·5 cm. longo conspicue alato alis basi auriculatis suffulta. *Panicula* terminalis, pedunculo communi 3 cm. longo incluso 14 cm. longa, inferne 6 cm. diametro, iuventute pulverulenta, rhachi quadrangulari angulis anguste alatis, ramulis plus minusve angulatis vix alatis ; pedicelli 4 mm. longi, subteretes ; bracteae deciduae ; flores purpurei (ex *Kerr*). *Receptaculum* supra ovarium ad 3 mm. tubuloso-productum, parte tubulosa post anthesin saepe decidua. *Fructus*

(vix maturus) saepissime subellipsoideus, 3–4 mm. longus, glaber, longitudinaliter 8-costatus.

Pattani, Bukit, 100 m., evergreen forest, *Kerr* 7874.

Allomorphia sylvarum *Geddes* [Melastomaceae-Oxysporeae] ; ab affini *A. exigua* Blume, var. *capillari* Ridl. foliis longius acuminatis, inflorescentiae ramulis magis robustis, cymis haud umbelliformibus, capsulis maioribus breviter crassius stipitatis recedit.

Frutex ad 3 m. altus (ex *Kerr*) ; ramuli primo ferrugineo-furfuracei, angulati, mox glabri, teretes, fuscescentes. *Folia* opposita inter se similia sed paulo inaequalia, elliptico-oblonga, longius acuminata, summo apice primo costa excurrente apiculata, basi cuneata vel rotundato-cuneata, 6–13·5 cm. longa, 2·5–5·2 cm. lata, chartacea, sicco supra fusco-brunnea, subtus viridia, supra primo ferrugineo-furfuracea, matura glabra, subtus sparse ferrugineo-furfuracea, e basi trinervia, nervo intramarginali etiam e basi oreunte tenuiore addito, nervis supra conspicuis, subtus prominentibus, nervis transversis inter se parallelis et ad 5 mm. distantibus supra conspicuis subtus prominulis, reticulatione vix conspicua, margine integra vel subintegra, anguste recurva, petiolo 0·7–1·4 cm. longo iuventute ferrugineo-furfuraceo supra canaliculato suffulta. *Panicula* fructescens, pedunculo communi 1·2–2·5 cm. longo incluso, 7·8–8·5 cm. longa, rhachi et ramulis sparse ferrugineo-furfuraceis vel subglabris, ramulis inferioribus ad 2 cm. longis. *Capsula* subrotundata, ad 4 mm. longa, stipite crasso stramineo circa 1 mm. longo suffulta, calyce persistente coronata, prominenter 8-costata.

Nan, Doi Pu Ka, 1200–1600 m., common in evergreen, *Kerr* 4921.

Phaulanthus brevidens *Craib* [Melastomaceae-Oxysporeae] ; a *P. Helferi* Ridl. indumento sparsiore e pilis brevioribus constituto et calycis lobis conspicue brevioribus recedit.

Frutex circa 2 m. altus (ex *Kerr*) ; ramuli iuventute pallidi, dense breviter adpresse hirsuti, mox brunneo-corticati, plus minusve glabrescentes, lenticellis haud conspicuis, ad 5 mm. diametro. *Folia* opposita, paribus inter se similibus aequalibus vel parum inaequalibus, elliptico-ovata vel rotundato-ovata, apice subacute acuminata, basi saepe parum inaequilateralia, rotundata vel truncata et plus minusve leviter retusa, 10–15 cm. longa, 6·5–11 cm. lata, chartacea, sicco viridia, subtus pallidiora, supra ad nervos adpresse hirsuta, aliter matura scabridula, setis sparsis instructa, subtus ad nervos subadpresse hirsuta, aliter sparse hirsuta, e basi 7-nervia, nervis supra conspicuis subtus prominentibus exterioribus tenuioribus, nervis transversis inter se parallelis supra conspicuis vel subconspicuis subtus prominulis, margine ciliata, petiolo 3–7·5 cm. longo adpresse hirsuto suffulta. *Flores* fasciculati, et axillares et infra folia orti, punicei (ex *Kerr*), pedicellis usque ad 8 mm. longis sparse setulosis suffulti. *Receptaculum* ambitu oblongum, plus minusve obtuse angulatum, supra ovarium tubuloso-productum, paulo ultra 2 mm.

longum, circa 2 mm. diametro, setis rigidis albis adscendentibus subsparsis et processibus carnosis brevibus sparsis instructum. *Calycis* tubus circa 0·5 mm. longus; lobi late deltoidei, obtusi, circa 0·5 mm. longi et 1 mm. lati, sat crassi, dorso apice brevius cornuti, intra glabri. *Petala* 4, suboblonga, apiculata, 3 mm. longa, 1·25 mm. lata, glabra, medio incrassata. *Stamina* 8, inter se aequalia, filamentis 2·5 mm. longis, antheris filamentis subaequilongis dorso basi breviter calcaratis. *Stylus* 6 mm. longus; ovarium circa 1 mm. longum, a receptaculo fere omnino liberum, apice concavum, 4-loculare.

Songkla, Klawng Yai, 50 m., open evergreen forest, *Kerr* 15888.

Phaulanthus nervosus *Craib* [Melastomaceae-Oxysporeae]; a *P. Helferi* Ridl. ramulorum indumento breviore, receptaculi setis paucioribus, calycis lobis brevioribus, a *P. brevidente* Craib nervis transveris subtus prominentibus, pedicellis brevioribus inter alia recedit.

Frutex ad 2 m. altus (ex *Kerr*); ramuli setis adpressis brevibus hirsuti, primo compressi, sicco bisulcati, mox teretes, saepissime cinnamomei, ad 7 mm. diametro. *Folia* saepissime oblongo-elliptica, apice acute acuminata vel subacuminata, basi late cuneata, emarginata, 8–23 cm. longa, 3–11·5 cm. lata, rigide chartacea, sicco supra plus minusve fuscescentia, subtus pallide viridia, supra matura scabrida, iuventute setis paucis brevibus adpressis saepissime mox deciduis instructa, subtus setis brevibus subadpressis ad nervos dense aliter sparsius instructa, e basi 5-nervia, nervis duobus aliis tenuibus prope marginem saepissime additis, nervis supra conspicuis subtus prominentibus, nervis transversis inter se parallelis supra magis minusve conspicuis subtus subprominentibus, nervulis paucis subtus prominulis, hirsuto-ciliolata, petiolo 1–10 cm. longo indumento ei ramulorum simili tecto suffulta. *Flores* fasciculati, et axillares et infra folia orti; pedicelli 2–3 mm. vel infructescentes circa 4 mm. longi, setosi. *Receptaculum* ambitu oblongum, basi inaequaliter gibbosum, 2·5–3 mm. longum, setosum. *Calycis* lobi late deltoidei, medio apicem versus cornuti, circa 1 mm. longi, dorso sparse setosi. *Petala* quatuor, 2 mm. longa, 1·75 mm. lata, glabra, sat crassa. *Stamina* 8, inter se aequalia; filamenta 4 mm. longa; antherae 2·5 mm. longae, poro singulo apicali dehiscentes, basi antice nudae, postice breviter appendiculatae, loculis basi inter se breviter liberis. *Stylus* stamina paululo superans. *Semina* minuta, pallida, basi fusca, papillosa, cuneata, apice plana, horizontaliter acuminata.

Takuapa, Kapong, 100 m., evergreen forest, *Kerr* 17127.

Phaulanthus pedunculatus *Craib* [Melastomaceae-Oxysporeae]; a *P. brevidente* Craib et *P. nervoso* Craib foliis angustioribus, pedunculo communi evoluto recedit.

Frutex circa 1·5 m. altus (ex *Kerr*); ramuli iuventute graciles, teretes, cinnamomei, setulis adpressis hirsuti, demum parum fuscescentes, subglabri, ad 6 mm. diametro. *Folia* opposita, paribus inter

se similibus sed saepe parum inaequalibus, oblongo-lanceolata vel oblongo-elliptica, apice obtuse acuminata, basi late cuneata, rotundata, emarginata, 8–15 cm. longa, 3·3–5·8 cm. lata, chartacea, sicco supra plus minusve brunnescentia, subtus pallide viridia, supra scabridula et setulis paucis hic et illic instructa, subtus ad nervos pilis rigidis et setis brevibus subsparsis hirsuta, aliter similiter sed sparsius hirsuta, e basi 5-nervia, nervis supra conspicuis subtus prominentibus, nervis transversis inter se parallelis supra conspicuis subtus prominulis, margine sparse setuloso-ciliata, petiolo 1·5–5 cm. longo indumento ramulorum recto suffulta. *Inflorescentia* racemiformis, infra folia orta, pauciflora, rhachi cum pedunculo communi brevi ad 5 mm. longa ; pedicelli ad 7 mm. longi, primo rubro-tincti, sparse adpresse setulosi, basi parvi-bracteati. *Receptaculum* ambitu oblongum, circa 3 mm. longum, supra ovarium tubuloso-productum, iuventute sicco puniceum, dorso sparse breviter adpresse setulosum. *Calyx* 1 mm. longus, lobis quam tubo paululo brevioribus dorso medio apicem versus brevissime appendiculatis. *Ovarium* apice concavum, a receptaculo fere omnino liberum, 4-loculare.

Ranawng, La-un, 20 m., evergreen forest, *Kerr* 16491.

Sonerila angulata *Craib* [Melastomaceae-Sonerileae] ; a *S. ciliata* Ridl. caule inferne minus rigido angulato vix alato, a *S. flaccida* Stapf et King antheris multo longioribus recedit.

Caulis parce ramosus, circa 20 cm. altus, inferne radicans, sicco brunneus, angulatus, basi 3 mm. diametro, plus minusve glanduloso-subfurfuraceus. *Folia* opposita, paribus inter se similibus sed parum inaequalibus, suboblonga, apice acuminata vel subacuminata, obtusiuscula, basi parum inaequilateralia, cuneata vel late cuneata, 5–9·5 cm. longa, 2·5–4·3 cm. lata, submembranacea, sicco viridia vel parum brunnescentia vel supra albo-maculata, viva interdum rubro-tincta (ex *Kerr*), supra leprosula et parvi-pustulata macula quaque medio uni-setosa, subtus leprosula vel glabra, parvi-pustulata, costa supra conspicua subtus prominente, nervis lateralibus utrinque 3 obliquis pagina utraque conspicuis vel inferiore prominulis, margine argute denticulata, interdum undulata, petiolo 0·5–2 cm. longo suffulta. *Cymae* secundae, et terminales et ramulos laterales terminantes, pedunculo communi infructescente circa 3 cm. longo suffultae, et pedunculo et rhachi conspicue angulatis sicco stramineis ; bracteae deciduae ; flores purpurei (ex *Kerr*) ; pedicelli demum ad 6 mm. longi, conspicue angulati, straminei, glabri vel subglabri. *Receptaculum* 5 mm. longum, supra ovarium ad 2 mm. tubuloso-productum, glabrum vel interdum pilis perpaucis glanduloso-capitatis instructum. *Calycis* segmenta 3, deltoidea, acuta, 1·5 mm. longa. *Petala* 3, ovato-oblonga, 6 mm. longa, 2·5 mm. lata, dorso medio pilis sat longis glanduloso-capitatis instructa, aliter glabra. *Stamina* 3, filamentis fere 4 mm. longis, antheris 5·5 mm. longis superne angustatis, loculis basi inter se liberis. *Stylus* staminibus paulo brevior. *Capsula* circa 6 mm. longa, straminea.

Betong, 400 m., bank in scrub jungle, *Kerr* 7473 (*type* of *fruit*), 7473a (*type* of *flower*).

Sonerila insularis *Craib* [Melastomaceae-Sonerileae]; herba rhizomate brevi tuberiforme, caule gracili erecto vel adscendente, nodis superioribus approximatis, staminibus tribus distincta.

Herba rhizomate circa 1 cm. longo tuberiforme, caule annuo erecto vel adscendente usque ad 5 cm. longo simplice vel superne parce ramoso gracili sicco rubro glabro vel apicem versus pauperius barbato, nodis inferioribus sat distantibus superioribus approximatis. *Folia* opposita, ovata, oblongo-ovata, vel rarius rotundato-ovata, apice obtusa, basi rotundata vel truncata, haud rarius cordatula, 2–8 cm. longa, 1·5–4·5 cm. lata, sicco subviridia, membranacea, glabra, rarius subglabra, e basi 5–7-nervia sed parum variabilia, nervis duobus superioribus e basi oreuntibus vel basi cum costa longius confluentibus vel interdum paulo supra basem oreuntibus, nervis pagina utraque conspicuis, nervis transversis paucis vix conspicuis, margine setoso-denticulata, petiolo 0·8–2·5 cm. longo glabro vel parce glanduloso-barbato suffulta. *Cyma* terminalis, pedunculo communi ad 4 cm. longo suffulta, glabra vel fere glabra, bracteis parvis setaceis, pedicellis biseriatis circa 3 mm. longis quadrangulis; alabastra apice angustata, acuta. *Receptaculum* 4·5 mm. longum, supra ovarium tubuloso-productum, glabrum. *Calycis* segmenta deltoidea, acuta, circa 1 mm. longa, paulo incrasssata. *Petala* 3, oblongo-cuneata, apice cuspidato-acuminata, 7 mm. longa, 3 mm. lata, glabra, breviter unguiculata. *Stamina* 3, antheris apice attenuatis basi sagittatis, 5·5 mm. longis, filamentis 4 mm. longis. *Stylus* staminibus paulo brevior. *Fructus* stramineus, 5 mm. longus, apice 3–3·5 mm. diametro.

Kaw Pangan, *Put* 1166.

Sonerila notata *Craib* [Melastomaceae-Sonerileae]; herba erecta, caule duriusculo, foliis sicco plus minusve purpurascentibus ad nervos pallide notatis cognoscenda.

Herba erecta, caule simplice usque ad 7 cm. alto vel haud rarius vix evoluto inferne radicante angulato vel superne subalato duriusculo. *Folia* opposita inter se similia, oblongo-elliptica, elliptica, vel obovata, apice obtusa vel rotundata, interdum breviter acuminata, basi cuneata vel late cuneata, 2·5–11 cm. longa, 1·5–5·5 cm. lata, sicco membranacea, plus minusve purpurascentia, ad nervos pallide notata, glabra, nervis lateralibus pinnatis utrinque 4–5 pagina utraque cum costa conspicuis, nervulis paucis conspicuis, margine irregulariter pauci-denticulata, petiolo 2–17 mm. longo suffulta. *Inflorescentia* terminalis, cymosa, pedunculo communi incluso 4–8 cm. longa, alabastris et capsulis tantum visis; flores trimeri. *Receptaculum* supra ovarium tubuloso-productum. *Calycis* segmenta late deltoidea, acuta, dorso medio superne incrassata, circa 1·5 mm. longa et lata. *Stamina* 3. *Capsula* glabra vel rarius setosa, 3–4 mm. longa, pedicello 2–3 mm. longo suffulta.

Kanburi, Sai Yok, *Put* 1844.

Sonerila sylvicola *Craib* [Melastomaceae-Sonerileae]; herba erecta, fere glabra, rhizomate brevi repente, foliis oppositis inter se similibus pinnatim nervosis, staminibus tribus distincta.

Herba erecta, ad 20 cm. alta, rhizomate repente, caulibus simplicibus solitariis sicco rubris ad nodos inferiores saepe radicantibus. *Folia* opposita inter se similia, ovato-lanceolata, subovata, vel rarius subelliptica, apice obtusa vel acuta, basi cuneata vel late cuneata, 3–7·5 cm. longa, 2–3·5 cm. lata, sicco membranacea, viridia vel ad nervorum partes basales rubra, glabra vel saepe pagina superiore marginem versus pauci-setosa, nervis lateralibus utrinque 3–4 saepissime obliquis pagina utraque conspicuis vel subconspicuis, nervulis obscuris, margine setoso-denticulata, petiolo 1–1·7 cm. longo glabro vel apice pauci-barbato suffulta. *Inflorescentia* terminalis, glabra, pedunculo communi 1–4 cm. longo suffulta, bracteis parvis subulatis, pedicellis circa 3 mm. longis; alabastra longius attenuata. *Receptaculum* circa 5 mm. longum, supra ovarium tubuloso-productum, glabrum. *Calycis* segmenta deltoidea, acuta, dorso medio incrassata, 1·75 mm. longa, 1·5 mm. lata, glabra. *Petala* 3, oblongo-oblanceolata, acuminata, acuta, ad 13 mm. longa et 5 mm. lata, glabra. *Stamina* 3, filamentis 7 mm. longis, antheris paulo arcuatis apice productis 9 mm. longis, loculis basi productis inter se liberis, postice paululo supra filamentorum insertionem minute tuberculatis. *Stylus* 13 mm. longus.

Surat, Kao Nawng, 1100-1200 m., on trees in evergreen forest, *Kerr* 13268.

Marumia dimorpha *Craib* [Melastomaceae-Medinilleae]; a speciebus aliis visis receptaculis et calyce pilis ferrugineis brevibus stellatis obtectis praetereaque setis sat longis rigidis primo pilos stellatos gerentibus instructis recedens.

Frutex volubilis (ex *Kerr*); ramuli primo parum angulati, pilis stellatis ferrugineis dense furfuraceo-tomentosi, ad nodos prominenter annulati. *Folia* opposita, paribus inter se aequalibus vel subaequalibus, oblongo-elliptica, ovato-oblonga, vel rarius elliptica, apice acuminata, basi rotundata vel cordatula, 6·5–9 cm. longa, 2·7–5·5 cm. lata, rigide chartacea, pagina superiore viridia, saepe nitida, subtus ferruginea, supra ad nervos primarios sed praesertim ad costam breviter pubescentia, aliter glabra, subtus pilis ferrugineis stellatis sat dense subhirsuta, e basi 5-nervia, nervis supra impressis subtus prominentibus, nervis transversis inter se parallelis et 3–5 mm. distantibus supra impressis subtus prominentibus, nervulis rete gracile supra vix conspicuum subtus prominulum efficientibus, margine integra, parum recurva, petiolo 5–7 mm. longo indumento ei ramulorum simili obtecto suffulta. *Cymae* axillares, 3–5-florae, pedunculo communi 2–2·8 cm. longo cum pedunculis partialibus ubi evolutis circa 1 cm. longis et pedicellis 0·5–1 cm. longis indumento ei ramulorum simili obtecto; bracteae deciduae, circa 1 cm. longae; bracteolae deciduae, 7 mm. longae; flores pallide punicei (ex *Kerr*). *Receptaculum* ambitu oblongum, supra ovarium ad 5 mm. tubuloso-

productum, circa 11 mm. longum et 7 mm. diametro, dorso pilis ferrugineis stellatis dense tectum praetereaque setis rectis primo pilos stellatos gerentibus superne gradatim longioribus et magis numerosis instructum, intra glabrum. *Calyx* dorso pilis stellatis ferrugineis obtectus; tubus 2 mm. longus, intra glaber; lobi oblongo-lanceolati, subacuti, 10 mm. longi, 5 mm. lati, intra stellato-tomentosi, medio intra incrassati, post anthesin reflexi, margine subregulariter denticulati. *Petala* 4, elliptica vel obovato-elliptica, circa 2·5 cm. longa et 1·5 cm. lata, glabra. *Stamina* 8, filamentis circa 12 mm. longis, glabris, loculis circa 1·5 cm. longis; 4 connectivo basi circa 7 mm. producto ima basi setis filamentosis 4 ad 9 mm. longis antice instructo postice calcarato, 4 connectivo vix producto setis similibus duabus instructo dorso calcarato. *Ovarium* apice liberum, pilosum, 4-loculare, placentis bilobatis; stylus 1·4 cm. longus, pilos paucos stellatos gerens.

Banang Sta, 50 m., edge of evergreen forest, *Kerr* 7283.

Marumia impressa *Craib* [Melastomaceae-Medinilleae]; a *M. nemorosa* Blume indumento diverso, foliorum nervis supra impressis inter alia differt.

Frutex scandens; ramuli teretes, pilis stellatis ferrugineis vel cinnamomeo-ferrugineis obtecti, ad nodos annulato-incrassati. *Folia* opposita, paribus inter se aequalibus, saepissime oblonga, oblongo-elliptica, vel iuniora late lanceolata, apice obtuse acuminata, basi rotundata vel cordatula, 6·5–12 cm. longa, 2–5 cm. lata, rigide chartacea, sicco supra viridia, subtus ferruginea vel cinnamomeo-ferruginea, pagina superiore primo pilis ferrugineis stellatis conspersa, mox nisi ad nervos primarios glabra, inferiore pilis stellatis ferrugineis vel cinnamomeo-ferrugineis persistenter subhirsuta, e basi 5-nervia, nervis supra impressis subtus prominentibus, nervis transversis numerosis inter se parallelis et 3–5 mm. distantibus supra impressis subtus prominentibus, nervulis rete supra gracile vix conspicuum subtus laxum subprominulum efficientibus, margine integra, parum recurva, petiolo circa 5 mm. longo indumento ei ramulorum simili obtecto suffulta. *Cymae* axillares, 3-florae, pedunculo communi 2–3·5 cm. longo suffultae, partibus omnibus pilis iis ramulorum similibus obtectae; bracteae deciduae; bracteolae duae, etiam deciduae, circa 5 mm. longae; pedicelli sub anthesin 3–5 mm. longi. *Receptaculum* ambitu oblongum, supra ovarium tubuloso-productum, circa 1 cm. longum et 6 mm. diametro, dorso pilis brevibus ferrugineis stellatis obtectum, intra glabrum. *Calyx* tubo intra glabro excepto utrinque similiter tectus; tubus circa 2 mm. longus; lobi reflexi, oblongo-lanceolati, obtusi, 12 mm. longi, 6 mm. lati, intra medio incrassati. *Petala* 4, punicea (ex *Kerr*), obovato-rotundata, 2·7 cm. longa, 2·5 cm. lata, glabra, breviter late unguiculata. *Stamina* 8, filamentis 1·3 cm. longis; antherae 4 ad 2 cm. longae, connectivo basi 6 mm. producto ima basi setis filamentosis duabus circa 6 mm. longis et 4 brevioribus instructo et dorso incrassato vel parum producto, 4 breviores, connectivo basi

vix producto ima basi setis duabus filamentosis 6 mm. longis instructo dorso haud producto. *Ovarium* apice liberum, pilosum, 4-loculare, placentis bilobatis; stylus 2·2 cm. longus, primo pilos paucos stellatos gerens.

Takuapa, Kapong, 100 m., edge of evergreen forest, *Kerr* 17110.

Medinilla elliptica *Craib* [Melastomaceae-Medinilleae]; a speciebus aliis floribus pentameris e peninsula malayana foliis oppositis sessilibus vel subsessilibus, panicula terminali recedit.

Fruticulus epiphyticus (ex *Kerr*), ad innovationes ferrugineo-furfuraceus, aliter glaber; ramuli primo compressi vel angulati, stramineo-corticati, lenticellis haud conspicuis, annotini subteretes, lenticellis prominentibus tuberculati. *Folia* opposita, saepissime elliptica vel oblongo-elliptica, apice obtuse acuminata, basi rotundata, vel cordatula, 6–9·5 cm. longa, 2·5–4 cm. lata, subcoriacea, sicco subviridia, subtus pallidiora, triplinervia, nervis supra conspicuis subtus prominentibus, nervo intramarginali e basi oreunte multo tenuiore evoluto, nervulis fere omnino obscuris, margine integra, anguste cartilaginea, saepe parum recurva, sessilia vel subsessilia. *Panicula* terminalis, pedunculo communi 1–2 cm. longo incluso 4–5 cm. longa, ad 6 cm. lata, ad nodos ferrugineo-furfuracea, pedunculis et pedicellis primo pilis brevibus ferrugineis sparsissime instructis, pedunculis lateralibus ad 1 cm. longis; flores punicei (ex *Kerr*), pedicellis circa 7 mm. longis suffulti. *Receptaculum* circa 4 mm. longum, supra ovarium parum productum. *Calycis* tubus brevis, sub anthesin fere truncatus. *Petala* 5, suboblonga, paululo ultra 1 cm. longa, circa 8 mm. lata. *Stamina* 10, filamentis circa 8 mm. longis, antheris 6–8 mm. longis basi antice bituberculatis postice appendiculatis. *Stylus* circa 1·2 cm. longus.

Ranawng, Kao Pawta Chongdong, 900 m., evergreen forest, *Kerr* 16779.

Medinilla emarginata *Craib* [Melastomaceae-Medinilleae]; ab affini *M. Scortechinii* King foliis et inflorescentiis brevioribus recedit.

Frutex epiphyticus; ramuli parum complanati, stramineo- vel pallide brunneo-stramineo-corticati, subsparse tuberculati, maturi glabri. *Folia* oblongo-oblanceolata, oblongo-lanceolata, vel suboblonga, apice obtuse acuminata, basi cuneata, 7–11 cm. longa, 2·7–3·5 cm. lata, sicco chartacea vel subcoriacea saepe viridia, triplinervia, nervis pagina utraque conspicuis, nervulis rarius subconspicuis, glabra, margine integra, parum recurva, sessilia vel petiolo circa 2 mm. longo suffulta. *Cymae* ex axillis foliorum delapsorum ortae, pedunculo communi ad 7 mm. longo incluso ad 2 cm. longae, floribus circa 5; bracteae deciduae; pedicelli ad 8 mm. longi; flores albi (ex *Kerr*). *Receptaculum* circa 3 mm. longum. *Calycis* lobi rotundati, circa 1 mm. longi et 2 mm. lati, apice emarginati. *Petala* 4, obovata, apice truncata, 12 mm. longa, 6·5 mm. lata. *Stamina* 8, inter se aequalia, filamentis 7·5 mm.

longis, antheris apice attenuatis 6 mm. longis basi antice bituberculatis postice breviter calcaratis. *Stylus* 1·4 cm. longus; ovarium 4-loculare.

Kao Kalakiri, 900 m., evergreen forest, *Kerr* 7773.

Medinilla ferrata *Craib* [Melastomaceae-Medinilleae]; a *M. crassifolia* Blume ramulis magis tuberculatis distinguenda.

Frutex epiphyticus (ex *Kerr*), gemmis ferrugineo-pubescentibus exceptis glaber; ramuli cinerei vel stramineo-cinerei, prominenter tuberculati. *Folia* opposita, elliptica, vel oblongo-elliptica, apice subacute acuminata, basi cuneata, 8–18 cm. longa, 3·7–7·5 cm. lata, carnosa, sicco rigide chartacea, e basi vel fere e basi trinervia, nervo intramarginali multo tenuiore addito, nervis supra conspicuis subtus prominentibus, nervis transversis paucis hic et illic subconspicuis, margine integra, parum recurva, petiolo 0·8–1·8 cm. longo supra late canaliculato suffulta. *Cymae* ex axillis foliorum delapsorum ortae, saepissime 5-florae, pedunculo et pedicellis gracilibus, pedunculo communi 1–2·3 cm. longo incluso ad 4·5 cm. longae, glabrae, pedicellis 8–10 mm. longis, bracteis et bracteolis deltoideis circa 1 mm. longis. *Receptaculum* 4 mm. longum. *Calycis* tubus truncatus, 1·5 mm. longus. *Petala* 5, alba (ex *Kerr*), oblongo-cuneata, apice breviter mucronulata, 14–19 mm. longa, 8–9 mm. lata. *Stamina* 10; fllamenta 7–8 mm. longa; antherae arcuatae, apice productae, 9 mm. longae, basi antice bituberculatae, postice breviter calcaratae. *Stylus* 12 mm. longus.

Surat, Kao Nawng, 800 m., evergreen forest, *Kerr* 13253.

Memecylon Brandisianum *Craib* [Melastomaceae-Memecyleae]; a *M. garcinioide* Blume ramulis pallidioribus, foliis sicco viridibus, pedunculo communi et pedicellis conspicue longioribus recedit.

Arbor circa 7 m. alta (ex *Kerr*), glabra; ramuli primo straminei, mox cinerei vel cinnamomeo-cinerei, teretes, lenticellis haud conspicuis. *Folia* oblongo-elliptica vel elliptica, apice obtuse acuminata, basi cuneata, acuminato-cuneata, vel rarius late cuneata, 10–12·5 cm. longa, 4·3–5·7 cm. vel rarissime usque ad 7 cm. lata, chartacea, sicco pagina utraque viridia, inferiore parum pallidiora, interdum lutescentia, costa subtus prominente, nervis lateralibus utrinque circa 10 pagina superiore subconspicuis inferiore conspicuis bene intra marginem anastomosantibus, nervis transversis obscuris, margine integra, parum recurva, petiolo 5–7 mm. longo supra late canaliculato suffulta. *Cymae* axillares, umbelliformes, petiolo paulo longiores, pedunculo communi saepissime solitario 5–10 mm. longo compresso sulcato suffultae; pedicelli ad 3 mm. longi, basi parvibracteati; alabastra cum pedicellis sicco atra, longius acuminata. *Receptaculum* circa 2 mm. longum, supra ovarium productum, basi rotundatum vel subrotundatum. *Calyx* ante anthesin subtruncatus, margine pallidus.

Terutao, under 5 m. evergreen forest, *Kerr* 14169.

Memecylon caudatum *Craib* [Melastomaceae-Memecyleae]; a *M. Griffithiano* Naud. et *M. corticoso* Ridl. foliis latioribus, nervis lateralibus pagina inferiore magis prominentibus distinguendum.

Arbor circa 5 m. alta (ex *Kerr*), glabra; ramuli iuventute straminei, 4-alati, mox teretes, 2–3 mm. diametro, cortice brunneo substriato obtecti, lenticellis haud conspicuis. *Folia* ovato-lanceolata, caudato-acuminata, summo apice obtusa, basi rotundata, 12-17 cm. longa, 3·5–5·7 cm. lata, rigide chartacea, sicco viridia, costa supra impressa subtus prominente, nervis lateralibus utrinque circa 15 rectis supra impressis subtus subprominentibus conspicue anastomosantibus et 2–5 mm. intra marginem nervum intramarginalem undulatum supra impressum subtus subprominentem efficientibus, nervis paucis aliis tantum paulo minus conspicuis interiectis, nervulis paucis subtus conspicuis, margine integra, saepe parum recurva, subsessilia vel petiolo circa 2 mm. longo suffulta. *Inflorescentia* infra folia orta; pedunculus communis haud evolutus; flores ignoti. *Fructus* pedicello 3 mm. longo suffultus, subglobosus, calyce persistente coronatus, fere 1 cm. diametro, pericarpio primo purpureo maturo sicco pallide viridi plus minusve lenticellato crustaceo tenui; semen solitarium, nitidum, stramineo-brunneum.

Kanburi, Wangka, 700 m., by stream in evergreen forest, *Kerr* 10433.

Memecylon constrictum *Craib* [Melastomaceae-Memecyleae]; inter species foliis maioribus et nervis lateralibus conspicuis receptaculo supra ovarium conspicue constrictum distinctum.

Frutex circa 3 m. altus (ex *Haniff et Nur*), glaber; ramuli teretes, primo parum angulati, circa 3 mm. diametro, cortice cinereo-brunneo obtecti, lenticellis haud conspicuis. *Folia* saepissime ovato-elliptica, vel oblongo-elliptica, apice acuminata vel subacuminata, obtusa, basi cuneata, saepe parum inaequilateralia, 7–13 cm. longa, 3·5–5·3 cm. lata, subcoriacea, sicco supra brunnea, subtus pallide viridia, costa supra impressa subtus prominente, nervis lateralibus utrinque circa 12 rectis intra marginem anastomosantibus supra subconspicuis subtus prominulis, paucis aliis tantum paulo minus conspicuis interiectis, nervulis obscuris, margine integra, anguste cartilaginea, recurva, petiolo sat valido 2–4 mm. longo suffulta. *Cymae* et axillares et ex axillis foliorum delapsorum ortae, usque ad 1 cm. longae, pedunculo communi brevi; pedicelli circa 1 mm. longi; bracteae deciduae; alabastra obtusa vel brevissime obtuse acuminata. *Receptaculum* ad ovarium 1 mm. diametro, supra ovarium ad 0·5 mm. diametro constrictum, inde dilatatum, apice circa 2·5 mm. diametro, sicco pallidum, parum pustulatum, intra supra ovarium costatum. *Calycis* tubus brevis, incurvus, apice truncatus. *Petala* 4, pallide azurea (ex *Haniff et Nur*), subquadrata, apice breviter acuminata, circa 1·75 mm. longa et lata. *Stamina* 8, filamentis 1·5 mm. longis, antheris antice glandula concava conspicua parva instructis, loculis circa 0·75 mm. longis, connectivo ad

1 mm. producto. *Ovarium* circa 1·25 mm. longum; ovula 9, basalia.

Kopah, Bukit Tinggi, Ban Krap, 300 m., *Haniff et Nur* 2732.

Memecylon dissitum *Craib* [Melastomaceae-Memecyleae]; ab affini *M. garcinioide* Blume inflorescentiis laxioribus e floribus paucioribus sicco fuscis constitutis, fructu maiore recedit.

Frutex circa 1·5 m. altus (ex *Kerr*), glaber; ramuli sicco iuventute subplumbei, parum compressi, haud sulcati, mox pallide brunnei, demum cinerei vel brunneo-cinerei, lenticellis haud conspicuis, ad 3 mm. diametro. *Folia* oblongo-ovata, oblongo-lanceolata, vel oblongo-elliptica, apice acute acuminata, basi cuneata vel acuminato-cuneata, 9 13·5 cm. longa, 3 5·7 cm. lata, chartacea, sicco olivacea vel fusco-olivacea, nervis lateralibus utrinque circa 10 intra marginem anastomosantibus saepissime pagina utraque conspicuis vel subconspicuis, margine integra, parum recurva, petiolo 3–4 mm. longo suffulta. *Cymae* et axillares et infra folia ortae, 3–6-florae, pedunculo cummuni 4–5 mm. longo suffultae; pedicelli graciles, 3–4 mm. longi; alabastra sicco cum pedicellis fusca, breviter acuminata. *Receptaculum* breve, latum, intra supra ovarium costatum. *Calycis* tubus brevis, apice truncatus vel irregulariter denticulatus. *Petala* 4 vel 5, oblata, breviter acuminata, ad 2 mm. longa et 3 mm. lata, sat crassa, azurea (ex *Kerr*). *Stamina* 8 vel 10. *Fructus* sicco substramineus, ambitu subellipticus, basi oblique gibbosus, circa 10 mm. longus et 8 mm. diametro, tubo persistente ad 2 mm. longo coronatus; semen solitarium.

Nakawn Sritamarat, Kao Luang, 200-300 m., evergreen forest, *Kerr* 15408.

Memecylon Geddesianum *Craib* [Melastomaceae-Memecyleae]; a *M. laevigato* Blume cymis longius pedunculatis, floribus paucioribus, alabastris longe acuminatis, a *M. Chevalieri* Guillaumin foliis pro longitudine angustioribus, petalis maioribus, stylo longiore differt.

Frutex circa 3 m. altus (ex *Kerr*), glaber; ramuli lateraliter sulcati, mox teretes, cortice brunneo vel cinereo-brunneo obtecti, lenticellis haud conspicuis. *Folia* oblongo-elliptica, elliptica, lanceolata, vel subobovata, saepe parum inaequilateralia, apice obtuse acuminata, basi cuneata, 5-8·5 cm. longa, 2 4 cm. lata, subcoriacea, sicco supra pallide viridia, subtus lutescentia, costa supra impressa subtus prominente, nervis lateralibus obscuris, margine cartilaginea, parum recurva, petiolo circa 5 mm. longo supra canaliculato suffulta. *Cymae* axillares, solitariae, pedunculo communi circa 1 cm. longo incluso ad 1·5 cm. longae, paucifloraе; bracteae angustae, circa 1·25 mm. longae, deciduae; pedicelli 2·5 mm. longi; alabastra longe acuminata. *Receptaculum* supra ovarium productum, circa 1·5 mm. longum. *Calyx* brevis, apice truncatus. *Petala* subrotundata vel quadrato-rotundata, apice longius acuminata, ad

3·25 mm. longa et 2·75 mm. lata. *Filamenta* 3 mm. longa, antheris 1·5 mm. longis, loculis 1 mm. longis. *Stylus* 5 mm. longus.

Surin, Sangka, 200 m., by stream in evergreen forest, *Kerr* 8268.

Memecylon kratense *Craib* [Melastomaceae-Memecyleae]; a *M. Griffithiano* Naud. foliis basi rotundatis vel cordatulis haud cuneatis vel rotundatis recedit.

Frutex glaber; ramuli iuventute 4-alati, straminei, mox teretes, cortice cinereo vel cinnamomeo-cinereo obtecti, lenticellis haud conspicuis. *Folia* lanceolata, vel oblongo-lanceolata, apice gradatim angustata, subobtusa, basi rotundata, interdum cordatula, rarius truncata, usque ad 18 cm. longa et 4·5 cm. lata, rigide chartacea, sicco viridia, subtus parum pallidiora, costa supra impressa subtus prominente, nervis lateralibus utrinque circa 20 pagina inferiore et interdum etiam superiore subconspicuis, nervulis obscuris, margine recurva, anguste cartilaginea, petiolo ad 2 mm. longo suffulta. *Flores* infra folia orti, fasciculati, vel rhachi sat valida breviter pauci-barbata brevi racemosim gesti; pedicelli 5 mm. longi, basi articulati; bracteae deciduae; alabastra obtusa. *Receptaculum* 2·5 mm. longum, supra ovarium productum, summo apice 4 mm. diametro intra supra ovarium costatum. *Calyx* ante anthesin distincte lobatus, sub anthesin denticulatus. *Petala* 4, oblata vel elliptico-oblata, apice rotundata, interdum breviter acuminata, ad 2·5 mm. longa et lata. *Stamina* 8, filamentis brevibus.

Krat, Kao Saming, *Put* 531.

Memecylon tricolor *Craib* [Melastomaceae-Memecyleae]; a *M. amabile* Bedd., var. *malaccense* C. B. Clarke foliis pro longitudine multo angustioribus recedit.

Frutex circa 1·5 m. altus (ex *Kerr*), glaber; ramuli iuventute conspicue 4-angulati vel ad angulos interdum fere alati, graciles, cinereo-corticati, mox teretes, cortice brunneo-cinereo obtecti, lenticellis haud conspicuis. *Folia* saepissime lanceolata, rarius oblongo-lanceolata vel ovato-lanceolata, apice fere semper obtusa, basi cuneata, 3–6 cm. longa, 0·7–1·7 cm. lata, subcoriacea, sicco viridia, subtus pallidiora, costa supra impressa subtus prominente, nervis lateralibus nervulisque obscuris, margine integra, recurva, anguste cartilaginea, petiolo circa 2 mm. longo supra canaliculato suffulta. *Cymae* in paniculas et axillares et infra folia ortas pedunculo communi 2–4 mm. longo incluso ad 1 cm. longas circa 1 cm. diametro superne vel saepe e basi ramosas dispositae; pedunculi 4-angulati, sicco virides vel saepe azureo-tincti; bracteae lanceolatae, 1·5 mm. longae, deciduae; pedicelli teretes, sicco azurei, 2–4 mm. longi, ima basi articulati; alabastra obtusa vel breviter obtuse acuminata. *Receptaculum* subturbinatum, ad ovarii apicem haud vel vix constrictum, supra ovarium productum, circa 2 mm. longum, summo apice circa 3 mm. diametro, intra subcostatum. *Calyx* ante anthesin breviter lobatus. *Petala* 4, paulo ante anthesin oblata, obtusa, 2 mm. longa, 2·5 mm. lata, sat crassa. *Stamina* 8.

Sakon, Wa Nawn, 200 m., open deciduous forest, *Kerr* 8495.

Lagerstroemia Noei *Craib* [Lythraceae-Lythreae] ; ab affinibus *L. Balansae* Koehne et *L. Collinsae* Craib alabastris apice longe acuminatis distinguenda.

Frutex circa 1 m. altus (ex *Noe*) ; ramuli graciles, teretes, primo pilis pallide fulvis brevibus stellatis tecti, pilis saltem paucis diu persistentibus, annotini cortice pallide brunneo obtecti, lenticellis obscuris. *Folia* opposita vel subopposita, oblonga vel suboblonga, apice obtuse acuminata vel subacuminata, basi rotundata, 5–8 cm longa, 2·2–3·5 cm. lata, rigide chartacea, sicco viridia, subtus parum pallidiora, iuventute pagina utraque pilis brevibus stellatis pallide fulvis obtecta, matura supra glabra, subtus subglabra vel saepissime ad costam pilis paucis stellatis instructa, nervis lateralibus utrinque circa 7 intra marginem anastomosantibus supra conspicuis subtus prominulis, nervulis rete gracile pagina utraque conspicuum efficientibus, integra, petiolo 2–3 mm. longo indumento ei ramulorum simili tecto supra canaliculato suffulta. *Flores* in paniculam terminalem pedunculo communi circa 2 cm. longo incluso 13 cm. longam basi 5 cm. latam internodiis infimis 2 cm. longis quam supremis duplo longioribus ramulis oppositis obliquis ad 4 cm. longis dispositi vel interdum panicula foliis breviore pauciflora ramulis inferioribus axillaribus ; rhachis cum pedunculis et pedicellis indumento ei ramulorum simili tecta ; pedicelli ad 7 mm. longi, apice bibracteolati vel floribus terminalibus subsessilibus ; alabastra turbinata, apice acumine 2 mm. longo instructa, basi angustata, 12 mm. longa, dense fulvo-tomentosa, haud costata. *Receptaculum* circa 4 mm. longum, intra glabrum. *Calycis* segmenta 5, oblongo-deltoidea, acuminata, 7 mm. longa, 4 mm. lata, crassa, intra superne dense albo-tomentosa. *Petala* 5, oblato-rotundata, 1·4 cm. longa, 1·5 cm. lata, ungui 2 mm. longo suffulta, dorso pilis paucis stellatis deciduis instructa. *Antherae* subrotundatae, circa 1·25 mm. diametro, connectivo lato. *Ovarium* pilosum, stylo 15 mm. longo ima basi pubescente aliter glabro.

Korat, Ban Chum Seng, *Noe* 246.

XXXVI.—MISCELLANEOUS NOTES.

Dr. J. M. Cowan, M.A., D.Sc., F.L.S., has been appointed, by the First Commisisoner of Works, Assistant to the Regius Keeper, Royal Botanic Garden, Edinburgh.

Dr. Cowan was formerly in the Indian Forest Service. After he retired he acted, for a time, as Superintendent of the Royal Botanic Gardens, Calcutta, and recently has been working as a Temporary Botanist in the Herbarium at Kew. In 1929 he went on an expedition, on behalf of Kew and the John Innes Horticultural Institution, to Persia for the purpose of studying agricultural and horticultural methods, and to make a collection of the representative plants of the country (*K. B.* 1930, App. I., pp. 5, 6).

Dr. C. R. Metcalfe, M.A., Ph.D., has been appointed, by the Minister of Agriculture and Fisheries, Assistant Keeper, Jodrell Laboratory, Royal Botanic Gardens, Kew.

We note with much pleasure that Dr. D. H. Scott, F.R.S., has been elected an Honorary Fellow of the Royal Society of Edinburgh.

Retirement of Mr. L. A. Boodle.—The inevitable flow of time has resulted in the loss to Kew of the services of another valued officer in the person of Mr. L. A. Boodle, Assistant Keeper of the Jodrell Laboratory, who reached the age limit on May 4th last. Mr. Boodle started on his scientific career at the Royal College (then the Normal School) of Science in 1886, where he had the advantage of being a pupil of Dr. D. H. Scott, under whom he served later at Kew when Dr. Scott was Honorary Keeper of the Jodrell Laboratory (see *K.B.* 1892, p. 245; 1906, p. 383). Mr. Boodle was appointed Demonstrator of Botany at the Royal College in the year 1890, and held that post until October 1st, 1904, when he was appointed an Assistant at the Royal Botanic Gardens, Kew, in the Jodrell Laboratory. On the retirement of Dr. Scott in 1906, Mr. Boodle took charge of the Laboratory, and was appointed Assistant Keeper on February 5th, 1909.

He was elected a Fellow of the Linnean Society in 1888 and served on the council on two occasions. His knowledge of botanical literature and of the anatomical structure of plants has been of invaluable help to Kew in a vast number of critical matters, and he has given very valuable assistance in connection with the identification of specimens from the Egyptian Tombs. His critical knowledge and remarkably sound judgment will be sadly missed by his colleagues, and he leaves Kew with their sincere good wishes and regards.

Sir George Watt was born in Old Meldrum, Aberdeenshire, on April 24th, 1851, and died at Lockerbie, Dumfriesshire, on April 2nd, 1930. He received a medical education in Aberdeen and Glasgow, taking the degrees of M.B. and C.M. at Glasgow in 1873. Teaching attracted him, and he became prodissector to the Professor of Anatomy in Glasgow; but almost immediately, on the recommendation of Sir Joseph Hooker, he was selected by the India Office for service under the Government of Bengal as the first professor of Botany in the Presidency College, Calcutta. He went to India at the end of 1873; and taught for ten years, but never in the Presidency College, for the first laid plans were changed; and Watt, disappointed, accepting an alternative post in the Bengal Education Department, was sent to the college at Hughli to initiate the teaching of Botany there and take his share in other work. He studied the flora of Lower Bengal and of other parts of India in his ample vacations, and formed a private herbarium. He devised an excellent

system of numbering his specimens in the field by means of tag-labels detached from the correspondingly numbered sheets of his field note-books, which system has now been generally adopted.

Success in collecting, and the credit brought to him by two papers on Indian Botany in the Journal of the Linnean Society, led him to seek in botanical exploration a more interesting field of work ; and at his own request, in 1881, he was attached as surgeon to the Burma-Manipur Delimitation Commission, with permission to use the opportunity for botanising. Before he had finished working out the results of the exploration of the frontier a new opportunity offered in connection with an Exhibition in Calcutta, and Watt was put in charge of the Economic Court. He threw all his energy into the preparations, and prepared an ordered account of the economic products of India, covering 1700 pages of print, which served both as a request for exhibits from local bodies all over India, as the plan upon which the exhibits were arranged on receipt, and also as a catalogue to the Court. The work marked out Watt's future, for the Government of India, observing how methodically he proceeded, and his conspicuous ability, requested him, at the close of the Exhibition, to elaborate the catalogue into his " Dictionary of the Economic Products of India," and at the same time to make preparations for the Colonial and Indian Exhibition of London, 1886. The first volume of the Dictionary was on sale at the Exhibition, and at its close he received the honour of the C.I.E.

The further eight volumes of the Dictionary were written after his return to India, where he now held the appointment of Reporter on Economic Products to the Government, in the Department of Revenue and Agriculture. He was also put in charge of a part of the Indian Museum, Calcutta, that he might form there a permanent exhibit of Indian produce in the newly built Economic Court. This Court was opened to the public at the commencement of 1900. Meanwhile by touring and collecting material he had laid the foundations for his subsequent work on cotton, and had written his " Blights and Pests of the Indian Tea Plant," and other papers.

When the Dictionary had been sold out, Watt was instructed to revise it as regards the commercial products only. But within a couple of months of commencing to do this, he was called away to prepare a fourth exhibition – the Delhi Exhibition of Indian Art. By a great effort he organised it in eight months and at the opening ceremony on January 2nd, 1902, his success was recognised by the honour of a knighthood. Shortly after the close of the Exhibition his book " Indian Art at Delhi " appeared ; and he left for England, arrangements having been made for carrying on his further work at Kew. In 1907 he published his " Wild and Cultivated Cottons of the World," and in 1908 the " Handbook of the Commercial products of India."

On the conclusion of this laborious undertaking he took a trip to S. Thomé to study Cacao cultivation, and on his return patented

machinery for curing Cacao. He then made Lockerbie his home, and for five years was lecturer on Indian trees to the forestry students at Edinburgh. He was a County Councillor, a Justice of the Peace, and a leader in educational matters. Horticulture was his hobby, and the grounds of the Crichton Royal Institution, at Dumfries, were laid out under his direction.

The successes of his career were made by his great energy and his devotion to orderliness: the gates leading to the career were two and both were opened by the famine policy of the Government. His first Indian appointment was created at the wish of Sir George Campbell, then Lieutenant-Governor of Bengal, as the result of a conviction born out of the Orissa famine of 1864 that teaching in India should be made to touch upon Agriculture: and his transfer to the Government of India followed the adoption of the recommendations of Sir John Strachey's Famine Commission, particularly that which urged the carrying on of scientific enquiry designed to lead to the gradual increase of the food supply of the country. It was because he was mindful of the intentions of his first appointment that he paid attention during his years of teaching to economic plants, and planned a book upon them, and undoubtedly his medical training was of use to him in economic research. I. H. B.

Impatiens Barnesii.—When applying this name to a new species from Southern India, in *K.B.* 1930, p. 153, the fact was unfortunately overlooked that the same name had been used in *K.B.* 1909, for a Philippine species (*Impatiens Barnesii* Hook. f., pp. 284 and 287). As I am anxious to retain the connexion with the collector of the Indian plant, I propose to rename the latter **Impatiens neo-Barnesii,** nov. nom. C. E. C. FISCHER.

Imperial Botanical Conference, 1930.—The Imperial Botanical Conference (1930), under the Presidency of Dr. A. W. Hill, C.M.G., F.R.S., will be held in the Metallurgical Lecture Theatre (Prince Consort Road) of the Imperial College of Science and Technology, South Kensington, on Friday, 15th August, at 10.30 a.m.

Agenda.

1. To consider Reports of Committees appointed to deal with Resolutions put forward at the final Session of the Imperial Botanical Conference (1924).
2. To discuss a proposal that an Imperial Botanical Conference, on the lines of that held in 1924, be arranged to take place; if such a Conference be approved, to decide on its date and to set up the necessary organization.
3. Any further business.

Professor W. Brown, Imperial College of Science and Technology, South Kensington, S.W.7, is Hon. Secretary.

Index Londinensis, Volumes 2 and 3, 1930.*—In October, 1929, the first volume of this important work made its appearance.† It included all plants from *Aa* to *Campanopsis*. The editor, Dr. Stapf, and his collaborators have now brought their great task two stages further with the issue of Volumes 2 and 3. The former, although dated 1930, appeared towards the end of 1929, and consists of 548 pages. It comprises references to illustrations of all plants from *Campanula* to *Dsysphania*, inclusive. Volume 3, published in June, 1930, consists of a little over 554 pages, and includes references to illustrations of all plants from *Earina* to *Justicia*, inclusive. With its issue half of the whole work is completed. The Index is recognised by many as a work of great utility, and a trustworthy and voluminous guide to all who desire to see pictures of plants or parts of plants. It should, in this respect, supply every need of the practical gardener, be he florist or arboriculturist, and of the botanist, whether he be systematist, morphologist, or dilettante collector. The work will help to direct attention to a good deal of the older literature which has been neglected in the past and which frequently contains much that is valuable. It will be found to fill many a gap caused by the omission of pictures of intrinsic merit in themselves but which, for one reason or another, have been entirely left on one side by botanical workers. It should also point the way to a proper discrimination in the choice of illustrations in the future. Another important function of the Index consists in the revision of the nomenclature of well-known large genera such as *Bignonia*, *Croton*, *Pinus*, etc., which hitherto have included a confused medley of plants which, according to modern ideas, should be placed in quite distinct genera. This revision, let us hope, may have some effect in inducing gardeners to name their plants more correctly. As regards the nomenclature, strict adherence to the International Rules has not been observed, e.g. *all* specific names are not necessarily spelt with a small initial letter and sometimes greater respect is paid to classical origins than to the law of priority. This semi-independence in the matter of nomenclature can in no sense detract from the value and usefulness of the work. The Oxford Press are again to be congratulated on the excellence of the printing. W. C. W.

Botanical Magazine.—The fourth and final part of Vol. cliii (1927) has now been published and contains the following plant portraits :—*Rhododendron Griersonianum* Balf. f. & Forrest (t. 9195), a native of Southwestern Yunnan ; *Primula Cawdoriana* F. Kingdon Ward (t. 9196), from the basin of the Tsang-po, S.E. Tibet ; *Cornus paucinervis* Hance (t. 9197), which is widely spread in China ; *Phalaenopsis violacea* Hort. Bogor. ex H. Witte (t. 9198), a native of Sumatra and Perak ; *Ranunculus Ficaria grandiflorus* F. Schultz (t. 9199), from the Mediterranean Basin ; *Rheum palmatum dissectum* Stapf, f. *rubriflora* (t. 9200), a new sub-species found in

*Published by the Clarendon Press, Oxford. Each volume price £5 5*s*.
†*Kew Bulletin*, 1929, p. 305.

Central Asia, Kansu and around Kuku Nor, Tibet; *Abies Faberi* Craib and *Abies Forrestii* Craib (t. 9201), both natives of China; *Rhododendron hedyosmum* I. B. Balf. (t. 9202), a dwarf species from Western Szechuan; *Columnea microphylla* Klotzsch & Hanst. (t. 9203), an endemic species in Costa Rica; and *Ephedra procera* Fisch. & Mey. (t. 9204), a native of the orient and distributed from Greece to the Caucasus and Afghanistan.

Chenopodium Nuttalliae, a Mexican cereal.—The use of the seed of *Chenopodium Quinoa* Willd. as a cereal in mountain areas in South America has long been known (*K.B.* 1909, pp. 425-27). It is cultivated particularly at the higher altitudes in the Andes and supplies food where other food crops cannot easily be grown. The plant has been introduced to other countries and has been found to do well in parts of Europe. A number of different cultivated forms of "Quinoa" exist, differences in the size and colour of the seed from different parts of South America being very noticeable. During the period of the Great War its cultivation in Germany was brought to the fore, the grain proving suitable in bread-making and as a food for cattle and poultry.* In 1916 the "Kriegsernährunsant" (Department for the distribution of food during the War) purchased the greater part of the harvest in that year so as to prevent the use of good seed as food.

In more recent years the use of an allied species, *Chenopodium Nuttalliae* Saff., by the inhabitants in certain parts of Mexico has been brought to notice. This plant, known to the Aztecs in Mexico as "Uauhtli," has in all probability been cultivated by them from time immemorial and is used in very much the same manner as "Quinoa" in the Andes. The plant differs from *C. Quinoa* in general appearance, and in the fact that the seed, when divested of the pericarp, is horn-coloured and not ivory-white as in *C. Quinoa*. The common form of *C. Nuttalliae* possesses achenes of a pale yellow or rose colour, though a form with dark brown seeds exists.

One of the methods of preparing the grain for food in Mexico is by roasting. The grain, a little at a time, is scattered into an earthenware pot heated over a fire. This causes the grain to pop or burst open like "pop-corn." As soon as the grain bursts it is removed from the pot, or burning occurs, and a fresh charge is added. A sample of the "popped" grain received at Kew is of a pleasing clean white colour and very light, the unbroken pieces being roughly ovoid in shape with a constriction in the centre and measuring 4–5 mm. in length and 2–3 mm. in width. In this condition, eaten with sugar and milk, it is said to afford an excellent breakfast dish. The ground grain is utilized by the inhabitants as a meal in various ways and the leaves and young shoots as a spinach. A method of utilizing the unripe inflorescences as food before the seeds

*Inter. Rev. of the Sci. and Prac. Agric., Rome, viii. p. 745 (May 1917).

harden is given as follows:—*" The spikes are washed and dipped in batter composed of egg, flour, and grated cheese, and then fried in lard. The ends of several spikes are thus held together, and it is the custom to seize the stem and draw them through the teeth, thus detaching the very palatable green buds [unripe achenes], which form thick clusters." The immature inflorescence prepared in the above way or in other ways is called " Uauhtzontli."

F. N. H.

The World's Grasses.†—At the present time when so much attention is being given to the economic aspect of the world's grasslands, and such a large amount of systematic, genetical, and ecological research is being carried out on the grasses themselves, the publication of what may be considered an advanced text-book of agrostology should be of great assistance. In the above work of about 360 pages, Dr. Bews has gathered together a wealth of information for the student. This is presented in nine chapters in which the author deals with the morphology, cytology, classification, phylogeny, ecology, etc., of the grasses.

In an introductory chapter, a general account of the family is given, together with notes on floral structure, trends of evolution, seed dispersal, etc. This is followed by a chapter on the general differentiation of the tribes and genera, in which their phylogeny and relationships are considered. Dr. Bews has applied his theory of ecological evolution to the Gramineae and his conclusions will be of especial interest both to the systematist and the ecologist. He points out that those grasses which approach most closely to the liliaceous type, such as the Bamboos, are found in the moist tropics or in hygrophilous situations elsewhere, whilst those types which the author considers most advanced are adapted to the most adverse climatic conditions. The order of classification formulated closely approximates to that adopted by Hitchcock in his " Genera of Grasses of the United States." Thus the Bambuseae are considered most primitive on account of their floral structure and type of habitat. The Phareae are placed next to the Bambuseae. Though certainly an ancient group, they are obviously more closely related to the Paniceae as their spikelet structure shows. The Festuceae and Aveneae respectively follow the Phareae. The subfamily Pooideae concludes with the Oryzeae. The second large group of grasses—the Panicoideae, commences with the Melinideae, a heterogeneous collection of genera which are mostly referrable to other tribes. The Paniceae are shown to be more primitive than the Andropogoneae, the latter showing advance in having better protected florets, more specialized inflorescences, and occurring in less favourable types of habitat.

---

* "*Chenopodium nuttalliae*, a food plant of the Aztecs," W. E. Safford, Jour. Washington Acad. Sci., Sept. 10, 1918, pp. 521-7.

† The World's Grasses, their differentiation, distribution, economics and ecology, by J. W. Bews. Longmans, Green and Co., London, pp. 408, fig. 48. Price 21*s*.

A key is given to the tribes and genera. This has been largely compiled from the works of Hackel, Stapf, Hitchcock, Chase and Camus. Those genera which have been placed in various tribes are keyed out in each of these.

Three chapters are devoted to the genera, in which the latter are arranged in a sequence to show their relationships. Under each is given the approximate number of species and the general distribution, together with notes on their ecology and economic uses.

In the first of two chapters dealing with the general ecology of grasses and grasslands, a number of types of habitat are considered and classified. The second chapter gives an outline of the world's grasslands.

Finally an account is given of the very numerous uses of the members of the family. The main cereal and fodder types are described and information is given on the cultivation of grasses and the management of grasslands, lawn-grasses and the making of lawns, etc.

The work concludes with a good, though far from complete, bibliography. Two important omissions from this are Steudel's " Synopsis Plantarum Glumacearum " and Hackel's " Monograph of the Andropogoneae." There is an appendix containing some recent additions to the family and an index. The book is fairly well illustrated, although one could have wished for better and more complete dissections to accompany the drawings and also for a few good photographs illustrating the types of grassland described.

C. E. H.

The Birds of Tropical West Africa.*—The distribution of the bird life, it is pointed out, is so entirely dependent on the distribution of the belts of vegetation, that the author has devoted considerable space to a general description of the belts of vegetation of Tropical West Africa and their correlation with faunal distribution. The area of Africa here discussed forms part of the West African Botanical Region and embraces two of the recognised Avifaunal Sub-Regions. The distribution of the vegetation is graphically shown on a map in colour, which has been specially prepared, from the most recent information, for this work and its companion " The Flora of West Tropical Africa."

In the section devoted to the relationship of the vegetation belts to the distribution of the bird life, the main types of vegetation are discussed and then contrasted with the Avifaunal divisions. It has not been found possible to use the same terms, as the vegetation terms are physiognomic and the Avifaunal geographic. The divisions, however, correspond.

The work will be found of value to all who are interested in natural history. To aid the novice without any technical

*By D. A. Bannerman. The Crown Agents for the Colonies, 4, Millbank, Westminster, 1930, pp. lxxv. + 376, full page plates and maps in colours 10, text figs. 119. Price 22*s.* 6*d.*

knowledge of ornithology an illustrated Key has been prepared by means of which the whole scheme of classification is much simplified.

The author, who is the acknowledged authority on this branch of the subject, has produced a work of first importance in a manner which cannot fail to make a wide appeal. His efforts have been ably seconded by the publishers, who have brought out a volume exceedingly well printed and admirably illustrated. This undoubtedly becomes a standard work on its subject for the area in question, and also provides a fund of information for reference for all countries which are visited by the birds described.

A Preface, by the Secretary of State for the Colonies, refers to the assistance in publication given by the British West African Colonies and the British Museum (Natural History).

T. F. C.

Victorian Orchids.*—The orchids of most countries seem to attract the attention of amateur botanists more readily than does any other group of plants. This is the case in Victoria, where there is an enthusiastic band of workers engaged in the study of this fascinating family. Mr. Pescott, a leading member of the group, attempts in this little book to give an account of the Victorian Orchids so far as they are known at present. Good descriptions are provided together with notes on distribution and other interesting biological facts. Some of the species are illustrated by photographs, which are often excellent. The value of the book, especially for the ordinary amateur interested in orchids, would be considerably enhanced, however, had Mr. Pescott provided artificial keys to both genera and species. Partial keys to *Thelymitra*, *Caladenia* and *Pterostylis* are indeed supplied, but even these are scarcely complete enough. In spite of this the book may be considered a valuable contribution to orchidology, since it gathers together much which was previously scattered in different publications.

V. S. S.

Australian Rain-Forest Trees.†—Anyone who is acquainted with tropical rain-forest, wherever it may occur, knows the immense wealth of species present and how difficult it is to identify the many different trees encountered. Those interested in the rain-forests of Queensland may therefore consider themselves fortunate in possessing such a thorough account of the chief species as is found in Mr. Francis's book. Each species is described fully, both field and technical characters being adequately dealt with, while there are

*The Orchids of Victoria. By E. E. Pescott. The Horticultural Pty., Ltd., Melbourne, 1928, pp. 92+suppl., 1 coloured and 14 photographic plates. Price 6*s*.

†By W. D. Francis. The Council for Scientific and Industrial Research, 314 Albert Street, East Melbourne, 1929, pp. ix+347, 213 half-tone plates, 25 figs., and rainfall map. Price 10*s*. Postage outside Australia 10*d*.

excellent illustrations both of the tree in situ and of the leaves, flowers, etc., the latter being made from herbarium specimens. In addition, descriptions of many of the less important trees and of the tree-like shrubs are included in order to render the work more complete. All the descriptions, which are entirely original, are in non-technical language, and are accompanied by notes on the distribution and economic properties of the species.

There are introductory portions on the rain-forest vegetation and its relation to various climatic and soil factors, and on such interesting features as the production of buttresses, etc. The bark and timber are also dealt with, there being some excellent photo-micrographs of both. Descriptions of the families present and an artificial key, enabling the student to identify any unknown plant more or less precisely, complete what is altogether an extremely useful and admirable book.

It is to be hoped that Mr. Francis may at some time be enabled to provide a supplementary volume dealing with those rain-forest trees which are restricted to the Tropics in Queensland, and which have been omitted from the present work owing to our imperfect knowledge of them. V. S. S.

Illustrations of British Plants.*—A supplement or a really new edition of Bentham's well-known ' Handbook of the British Flora,' with its companion volume of ' Illustrations ' by Fitch, has long been needed. Mr. Butcher and Miss Strudwick are to be congratulated on the results of their joint attempt to supply this need. The present volume contains 485 black-and-white figures, accompanied by concise descriptions, of critical, rare, or newly discovered British species of plants. The variable and complex genera *Rubus*, *Hieracium*, *Euphrasia*, and *Salix* are wisely omitted, or represented by a few examples, and only selected microspecies of several other genera are included. The figures of Batrachian *Ranunculi*, *Callitriche*, *Sagina*, and *Bromus* are likely to be particularly useful. Most of the drawings and descriptions are excellent, though they naturally vary in merit. The figures of willows, poplars, and grasses especially deserve commendation, but the plates of *Eranthis hyemalis* and *Silene maritima* are somewhat below the average standard. A number of misprints, as *Bromus hordaceus* (for *hordeaceus*), should be corrected in the next edition. Three new species of the genus *Thalictrum* are described and it is to be regretted that actual specimens are not quoted for these, especially for *Thalictrum umbrosum* Butcher. In spite of some minor defects this book is bound to be of great value to all British botanists and should stimulate interest in the critical study of British plants.

W. B. T.

---

*Further Illustrations of British Plants, by R. W. Butcher, drawings by F. E. Strudwick. L. Reeve & Co., Ltd., 1930, pp. 476, price 12/-.

(486) Wt. 144/19 950 8/30 S.E R. Ltd. Gp. 9